User Manual

EDANUSA

DUS 3 VET

Veterinary Digital Ultrasonic Diagnostic Imaging System

Version 1.2

CE

About this Manual

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Statement

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The equipment is used in accordance with the instructions for use.

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Terms Used in this Manual

This guide is designed to give key concepts on safety precautions.

WARNING:

A **WARNING** label advises against certain actions or situations that could result in personal/animal injury or death.

CAUTION:

A **CAUTION** label advises against actions or situations that could damage equipment, produce inaccurate data, or invalidate a procedure.

NOTE:

A NOTE provides useful information regarding a function or a procedure.

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Chapter 1 Introduction

1.1. Intended Use

The DUS 3 VET Veterinary Digital Ultrasonic Diagnostic Imaging System is intended for diagnostic ultrasound imaging analysis on animals. The DUS 3 VET is intended for use by or on the order of a veterinarian or similarly qualified health care professional for ultrasound evaluation of Abdomen; Small Organ; Cardiology; Peripheral Vessel; Musculo-skeleton (both Conventional and Superficial); and Transrecta.

1.2. Features

This portable device, Veterinary Digital Ultrasonic Diagnostic Imaging System (DUS 3 VET), is a high-resolution linear/convex scanning diagnostic apparatus.

Applied technologies:

Tissue Specific Imaging (TSI), Tissue Harmonic Imaging (THI), Digital Beam-Forming (DBF), Dynamic Receiving Focusing (DRF), Real-time Dynamic Aperture (RDA), Dynamic Frequency Scanning (DFS), and Dynamic Apodization.

Display modes:

B, B+B, 4B, B+M, and M.

Measurement and calculation functions:

B-mode generic measurement and calculation: Distance, circumference, area, volume, ratio, % stenosis, and angle;

M-mode generic measurement and calculation: Time, slope, and heart rate.

File management:

It supports local disk and removable disk storage. USB 1.1 interface enables fast image uploading to your computer in the real-time mode. It has a 56 MB storage capacity.

Operation:

The folding keyboard designed with trackball is easy and convenient for various types of operation.

In addition, 10" non-interlaced progressive display and diverse probes are adopted to provide a clear and stable image.

1.3. Model

DUS 3 VET

1.4. Contraindication

- The equipment is not applicable to the diagnosis of the pneumatic organs that contain gas such as lung, stomach, intestines, etc.
- It is recommended not to examine the parts with wounds or acute inflammation to avoid cross infection.

1.5. General Safety Precaution Information

1.5.1. General Information

WARNING

This equipment is not intended for treatment.

CAUTION

Federal (U.S.) law restricts this device to sale by or on the order of a veterinarian.

NOTES:

1. This equipment is not intended for home use.

2. The pictures and interfaces in this manual are for reference only.

The reliability of the device and the safety of operators and patients are considered during product design and production. The following safety and preventive measures should be carried out:

1. The device should be operated by qualified operators or under their instructions.
2. Do NOT alter parameters of the device at will. If it is necessary, please consult the manufacturer or authorized representatives for service.
3. The device has already been adjusted to its optimum performance. Do NOT adjust any pre-set control or switch, unless it is listed in the manual.
4. If the device breaks down, please shut down the machine immediately and contact the manufacturer or authorized representatives.
5. Only accessories supplied or recommended by the manufacturer can be used. Otherwise, the performance and electric shock protection can not be guaranteed. If electrical or mechanical equipment from other companies need to be connected to the device, please contact the manufacturer or authorized representatives before connection.
6. **EXPLOSION HAZARD**-Equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

1.5.2. Biohazard Considerations

WARNING

1. This device is not suitable for intracardiac use or direct cardiac contact.
2. For neonatal head imaging, the manufacturer recommends that you exercise special care during neonatal cephalic scanning to avoid possible damage to the posterior region of the eye. The ultrasound energy emitted by the transducer easily penetrates the fontanels of the infant.
3. The manufacturer makes every effort to manufacture safe and effective transducers. You must take all necessary precautions to eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials. These precautions should be considered in the use of any application that may indicate the need for such care, and during endorectal scanning; or when scanning patients with open wounds.

Ultrasound may be harmful to human body. This device should be used for valid reasons, for the shortest period of time, and at the lowest mechanical and thermal indices necessary to produce clinically acceptable images. According to the ALARA (As Low As Reasonably Achievable) principles, acoustic output should be set to the lowest level required to satisfactorily perform the examination. Long time exposure should be avoided. For the parameters of sound output, please refer to appendix II.

The DUS 3 VET complies with the requirements of applicable International Electrotechnical Commission (IEC) standards in terms of safety and acoustic output levels.

1.5.3. Electrical Safety

WARNING

1. The AC power connector plug for the ultrasound system is a three-prong grounded plug and should never be adapted to any two-prong (non-grounded) outlet, either by modifying the plug or by using an adapter.
2. To avoid electrical shock, never modify the ultrasound system's AC power circuits. To ensure grounding reliability, connect the system only to an equivalent outlet.
3. **SHOCK HAZARD-**Do NOT attempt to connect or disconnect a power cord with wet hands. Make certain that your hands are clean and dry before touching a power cord.
4. The equipment should be installed by a qualified service engineer. Do NOT try to access the interior of the main unit. Only authorized service personnel could remove the unit cover.

WARNING

5. Before use, you must make sure that there is no visible evidence of damage on the equipment, cables and probes which may affect patient safety or diagnostic capability. The recommended inspection interval is once per week or less. If damage is evident, replacement is recommended before use.
6. Equipment connected to the DUS 3 VET and located in the patient zone must be powered from a medically-isolated power source or must be a medically-isolated device. Equipment powered from a non-isolated source can cause your system to exceed leakage current limits. Enclosure leakage current created by an accessory or device connected to a non-isolated outlet may add to the enclosure leakage current of the imaging system.
7. Use an extension cord or multi-socket outlet setup to provide power to the ultrasound system or to the system's peripheral devices, may compromise the system grounding and cause your system to exceed leakage current limits.
8. To avoid electrical shock and damage to the system, turn off and disconnect the device from the AC power source before cleaning and disinfecting.
9. When more than one medical device is connected to the patient, leakage current of the devices is summed together. Take caution.
10. Don't touch the signal input or output connector and the patient simultaneously.
11. Periodically have the integrity of the system ground checked by a qualified service engineer.

CAUTION

1. To avoid the possibility of electrostatic shock and damage to the system, avoid using aerosol spray cleaners on the monitor screens.
2. Do NOT use spray cleaners on the system, as this may force cleaning fluid into the system and damage electronic components. It is also possible for the solvent fumes to build up and form flammable gases or damage internal components.
3. Do NOT use any fluid onto the system surface, as fluid seepage into the electrical circuitry may cause excessive leakage current or system failure.
4. To ensure proper grounding and leakage current levels, it is the policy of the manufacturer to have an authorized the manufacturer representative or an approved third party perform all on-board connections of documentation and storage devices to the DUS 3 VET.
5. The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal. Batteries are hazardous waste. Do NOT dispose

them together with house-hold garbage. At the end of their life hand the batteries over to the applicable collection points for the recycling of waste batteries. For more detailed information about recycling of this product or battery, please contact your local Civic Office, or the shop where you purchased the product.

NOTE:

Please use the standard power cord as the input line of the network power supply for the adapter to reduce risk.

Electromagnetic Compatibility (EMC)

Operating the DUS 3 VET in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations may lead to interference visible on the monitor screen. However, the device has been designed and tested to withstand such interference and will not be permanently damaged.

EMI Limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air of wiring. Ultrasound machines also generate EMI. The DUS 3 VET complies with limits as stated on the EMC label. However, there is no guarantee that interference will not occur in a particular installation.

Possible EMI sources should be identified before the unit is installed.

Electrical and electronic equipment may produce EMI unintentionally due to one of the following defects:

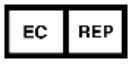
- High frequency electrotome
- Transformer
- Defibrillator
- Wireless LAN equipment
- Medical lasers
- Scanners
- Cauterizing guns
- Computers
- Monitors
- Fans
- Gel warmers
- Microwave ovens
- Light dimmers
- Portable phones

The presence of a broadcast station or broadcast van may also cause interference.

If you find strong interference shows on the screen, please check the sources.

1.6. Labeling Symbols

Descriptions of symbols of the device are shown in table 1-1.

Symbol	Definition
SN	Serial Number
P/N	Part Number
	Date of Manufacture
	Manufacturer
	Consult Instructions for Use
	Symbol for “Caution”
	Biological Risks
	It indicates that the equipment should be sent to special agencies according to local regulations for separate collection after its useful life.
	General symbol for recovery / recyclable
Rx only (U.S.)	Federal (U.S.) law restricts this device to sale by or on the order of a veterinarian.
	Authorized Representative in the European Community
	CE Mark
	Type B, Applied Part
	Alternating Current (a.c.)
	ON (AC power supply)
	OFF (AC power supply)
	Equipotentiality
VGA	VGA output, External Monitor
	Fuse

	Probe socket
	Net work port
	Foots witch To identify a foot switch or the connection for a foot switch.
	Protective earth (ground)
	Recording on an information carrier
EDAN	Trademark
	USB (Universal Serial Bus) Connection
	Dangerous voltage
	Variability, for rotating movement Rotate clockwise to increase the value, and counterclockwise to decrease the value.
	Variability Adjust right to increase the value, and left to decrease the value.

Table 1-1 Descriptions of Symbols

Chapter 2 System Overview

2.1. Appearance

2.1.1. Front Panel

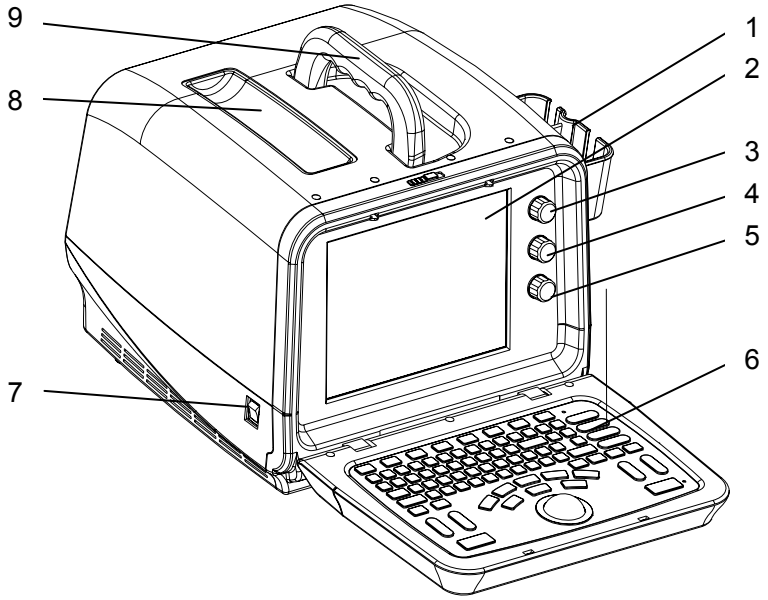


Figure 2-1 Front Panel Schematic Diagram

1 Probe holders

2 Display screen

3 Contrast adjustment knob

4 Brightness adjustment knob

5 Gain adjustment knob

6 Control panel

7 Power switch

8 Trough for the coupling gel

9 Handle

2.1.2. Rear Panel

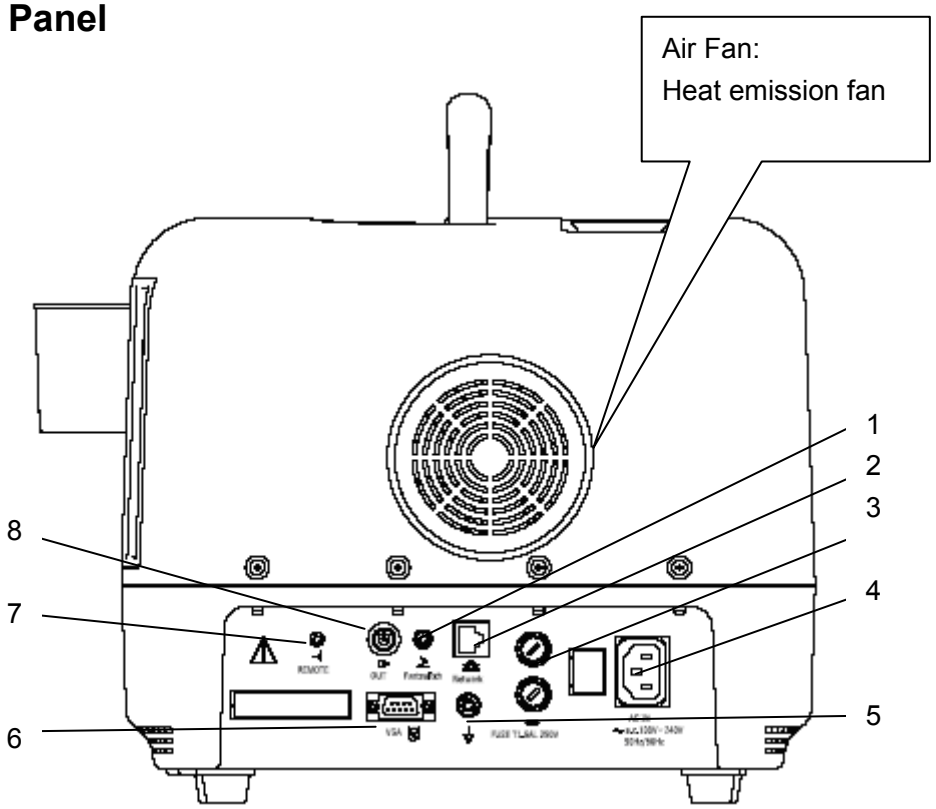


Figure 2-2 Rear Panel Schematic Diagram

1	Footswitch port
2	Network port
3	Fuse
4	Power supply input port
5	Equipotential earth terminal
6	VGA output port
7	Remote port
8	Video output port

CAUTION

To have good aeration performance and being able to operate normally, please don't cover or plug the air fan or heat dissipation orifice partly or wholly by any object.

2.1.3. Right View (Dual Probe Sockets)

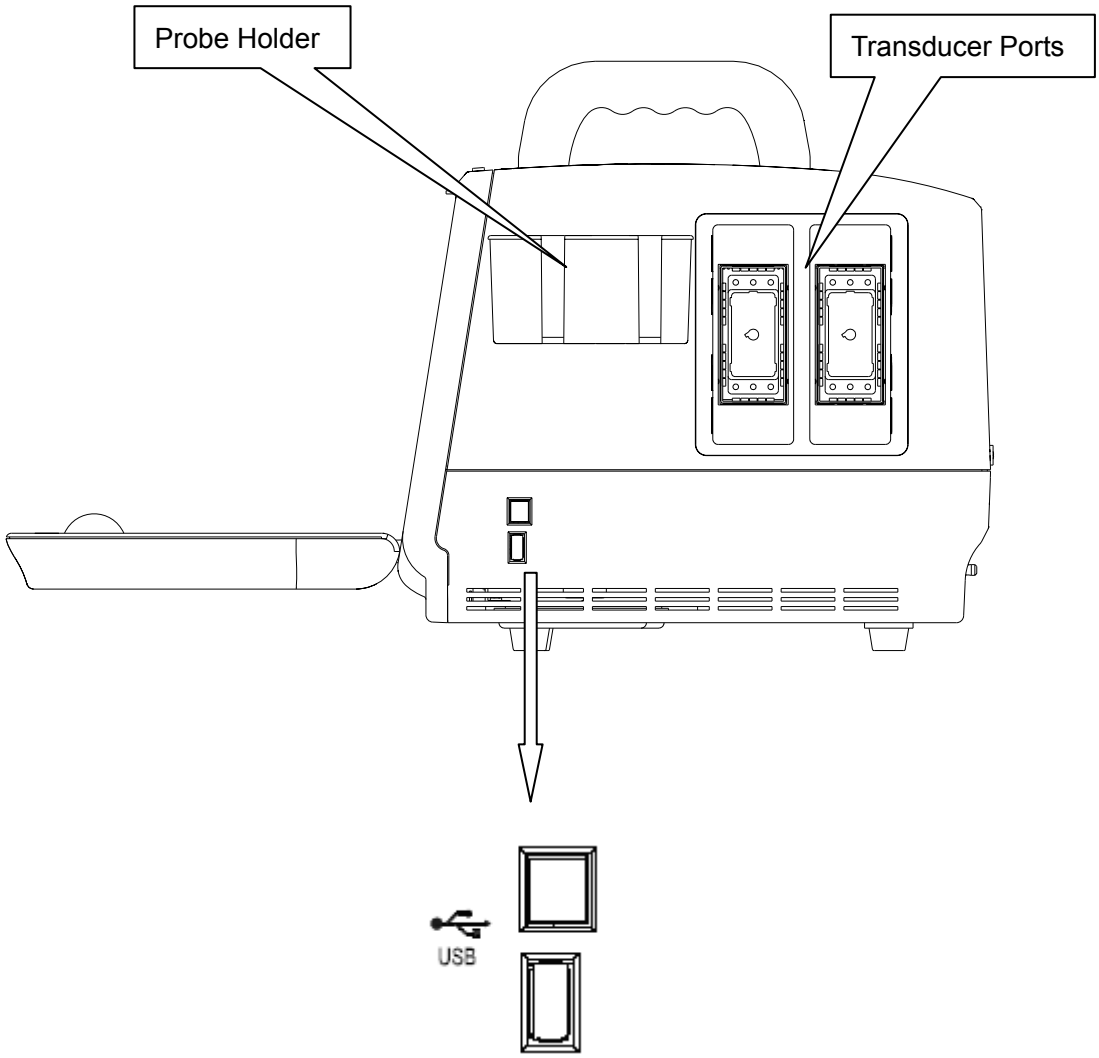


Figure 2-3 Right View Schematic Diagram

Peripheral port:

2 transducer ports (dual sockets)
2 USB ports
1 probe holder (for two probes)

2.2. Configuration

2.2.1. Standard Configuration

- one DUS 3 VET main unit
- one micro-convex array transducer: C611
- one power cord (European Standard)
- one potential equalization conductor

- one probe holder
- one cable holder
- two fuses, φ5×20, T1.6AL/250V
- one bottle of coupling gel 250mL
- one user manual
- two packing lists
- two silicon pads

2.2.2. Options

The Digital Ultrasonic Diagnostic Imaging System supports the following options:

(1) Transducers

- Convex array transducer C361-1, C341;
- Linear array transducer L741;
- Micro-convex array transducer C321-1;
- Veterinary linear array endorectal transducer V741;
- Veterinary linear array endorectal transducer V561.

(2) Others

- Ultrasonic Imaging Management System software specifications

  Operating system: support WINDOWS XP, WINDOWS VISTA and .WINDOWS 7.

- Video printer and USB printer, as shown in table 2-3.

Options	Recommended Models
Video printer	SONY UP-895MD, SONY UP-897MD, MITSUBISHI P93W
USB printer	HP DeskJet D2368, HP DeskJet D2468, HP DeskJet D2568 HP DeskJet D4368, HP LaserJet P2015, HP LaserJet P2035 HP deskjet f2418,*HP deskjet f2488*, HP2668, HP109A, HP D5568, HP2010, HP2050, HP1050

Table 2-1 Printers

NOTE:

Calibration should be performed because HP2010, HP2050, HP2050, HP2418* and HP2488* printers will print out calibration paper every time after replacing jet box. Please perform the calibration according to the operation method on the calibration paper.

The video printer output: 110 mm× 82 mm; The USB printer output: A4 paper, 210 mm× 297 mm.

- Puncture

Model	Name	Description
BGK-CR60	Needle Guide Bracket Kit	For the R60 probe, 4 vessels: 14G, 18G, 20G, 22G
BGK-CR40	Needle Guide Bracket Kit	For the R40 probe, 4 vessels: 14G, 18G, 20G, 22G
BGK-CR20	Needle Guide Bracket Kit	For the R20 probe, 4 vessels: 14G, 18G, 20G, 22G
BGK-MCR10UA	Needle Guide Bracket Kit	For the MR10UA probe, 4 vessels: 14G, 18G, 20G, 22G
BGK-LA40	Needle Guide Bracket Kit	For the L40 probe, 4 vessels: 14G, 18G, 20G, 22G

Table 2-2 Needle Guide Bracket Kit

- DICOM 3.0
- Footswitch: Single-pedal footswitch
- MT-802 Mobile trolley

  See MT-802 Trolley Assembling Instruction for detail information
- Hand carried bag

  The bag is portable and it can be carried over the shoulder. It can contain not only the main unit but also two probes (an array transducer R60/3.5MHz and an endorectal transducer L60/5.0MHz) and one bottle of coupling gel.

  It is watertight.
- Netac U disk: U180 (2G)
- USB mouse is supported. After connecting the mouse to the DUS 3 via the USB port, you can operate the system by using the mouse.The left button responnds to the **Set** key while the right button responds to the **Back** key.
-

Chapter 3 Transportation and Storage

3.1. Moving the System

Digital Ultrasonic Diagnostic Imaging System is designed to be portable and easily transported between sites. Power off the system and secure all accessories before moving it to another location.

CAUTION

1. Switch off the ultrasound system. Unplug the power cord from the power source and secure the power cable.
2. Put the probes in the probe holder, or remove them and place them in the protective carrying cases.
3. Disconnect and secure the footswitch and the connecting cable.
4. Raise the brakes away from the front and back caster wheels.
5. Push the handle to roll the system forward and maneuver it to its new location and lock the wheel caster brakes.
6. Connect optional system accessories, such as the single-pedal footswitch.
7. Secure the system and complete the system setup, and then perform all the daily checklist items before using it.

3.2. Storage

- Do NOT place the device near the ground, walls or roof.
- Keep good indoor ventilation. Avoid strong and direct sunlight, and erosive gas.

3.3. Transportation

To prepare the system for shipment over long distance or rough terrain, repack the system in the factory packing and crate.

To prepare the system for transport over distances: load the system into a vehicle using a lift gate.

To prevent lateral movement of the system, secure the system with cargo straps. To prevent sudden jarring of the system during transport, provide shock cushions beneath the system.

It is suitable for transportation by air, railway, highway and ship. Avoid splashing with rain and snow, inversion, and collision.

Chapter 4 Installation Instructions

4.1. Environmental Requirements

Keep the device away from equipment with strong electric field, strong magnetic and high voltage field, and protect the display screen from direct exposure to strong sunlight. Keep good ventilation.

4.2. Unpacking Inspection

Visually examine the package prior to unpacking. If any signs of mishandling or damage are detected, contact the carrier to claim for damage. After unpacking the device, customers should follow the PACKING LIST to check the product carefully and to make sure that no damage has occurred during transportation. Then, install the device according to the installation requirement and method.

WARNING

1. Do NOT use the device if it is found to be damaged or defective.
2. Do NOT drop or collide with the probe, otherwise you shall give up using it.

4.3. Connecting Procedure

1. Take the main unit and accessories out of the package.
2. Connect the cable holder, and silicone pads (if necessary) to the main unit correctly.
3. Connect the transducers to the main unit correctly.
4. Connect the printer and load the recording paper.
5. Connect the power cable
   1) Connect the main unit and the common earth terminal firmly via a potential equalization conductor.
   2) Plug one end of the power cable to the power socket of the main unit, the other end to the special power output socket of the hospital.
6. Switch on the main unit.

Press power switch on the left side of the main unit. You can operate the main unit after the main interface appears.

4.3.1. Assembling a Cable Holder

To connect a cable holder:

1. Find the cable holder, three screws (M3×12) and the packing foam in the package box.
2. To avoid scraping the main unit, put one piece of packing foam from the packing box below the main unit, and place it on a flat ground.
3. Carefully turn the main unit upside down on the packing foam and assemble the screws to the main unit with a cross-head screw driver as shown in figure 4-1.
4. Carefully turn the main unit with a cable holder to the normal state as shown in figure 4-2.

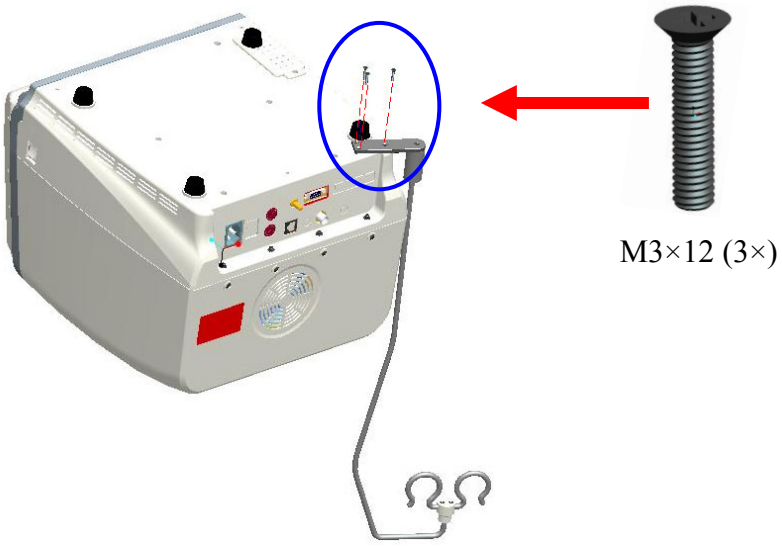


Figure 4-1 Assembling Position of Cable Holder

Figure 4-2 Main Unit with Cable Holder

4.3.2. Sticking Silicone Pads

NOTES:

1. There are two standby silicone pads for the system. If necessary, stick them on the rear surface of the keyboard to avoid abrasion, as shown below.
2. The pictures and interfaces in this manual are for reference only.

Figure 4-3 Sticking Silicone Pads on Main Unit

4.3.3. Connecting or Disconnecting Transducers

NOTE:

Ensure that the system is shut down before connecting and disconnecting transducers.

Flip images horizontally to change the scan direction or vertically to change the image orientation. The scan direction mark located at the side of probe indicates the beginning direction of scanning. The scan direction mark is as shown below.

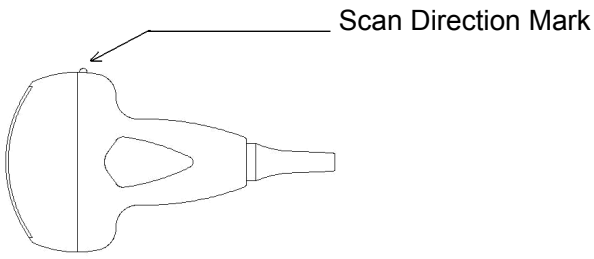


Figure 4-4 Probe Scan Direction Mark Schematic Diagram

There is information about Model and SN on the probe.

To connect a transducer:

1. Place the transducer's carrying case on a stable surface and open the case.

2. Carefully remove the transducer and unwrap the probe cable.
3. Do NOT allow the transducer head to hang free. Impact to the transducer head could result in irreparable damage.
4. Turn the connector locking handle counterclockwise as the mark on the **OPEN** icon to the horizontal position.
5. Align the connector with the transducer port and carefully push into place.
6. Turn the locking handle on the transducer connector clockwise as the mark on the **LOCK** icon to the vertical position. This ensures the connector in position and ensures the best possible contact.
7. Place the transducer in the transducer holder.

To disconnect a transducer:

1. Turn the locking handle on the connector housing counterclockwise as the mark on the **OPEN** icon to the horizontal position.
2. Firmly grasp the transducer connector and carefully remove it from the system port.
3. Store each transducer in its protective carrying case.

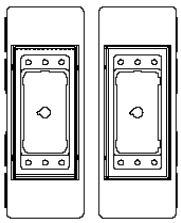


Figure 4-5 Transducer Ports

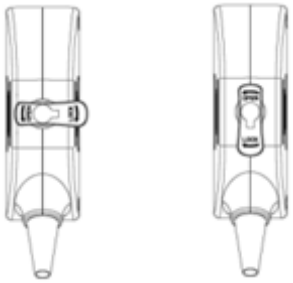


Figure 4-6 Locked and Unlocked Positions of the Probe Connectors

WARNING

Do NOT touch the pin of probe connector.

CAUTION

Do NOT plug or pull out the connector when the device is activated. This is to avoid uncontrollable damage to the probe and the main unit.

NOTE:

Once the probe is connected to the main unit, please do NOT reinstall it frequently. This is to avoid poor contact between the probe and the main unit.

4.3.4. Rear Panel Connections

Video connections are located on the rear panel of the DUS 3 VET.

WARNING

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore, all configurations shall comply with the valid version of the standard IEC/EN 60601-1-1. Therefore, anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.

CAUTION

To ensure proper grounding and leakage current levels, it is the policy of the manufacturer to have an authorized representative or approved third party to perform all on-board connections of documentation and storage devices to the DUS 3 VET.

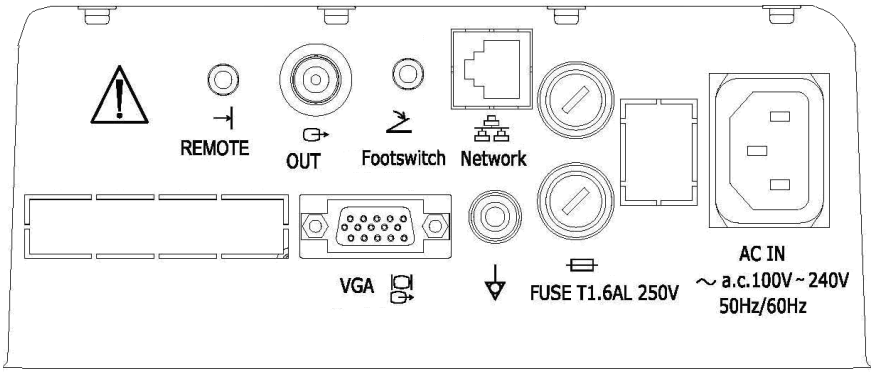


Figure 4-7 Rear Panel Connections

Peripheral ports:

1 remote port	1 Network port (DICOM 3.0)
1 video output port	1 power supply input port
1 foot switch port	2 fuses, φ5×20, T1.6AL/250V
1 VGA output port (15 pin)	1 equipotential earth terminal

Equipotential Bonding

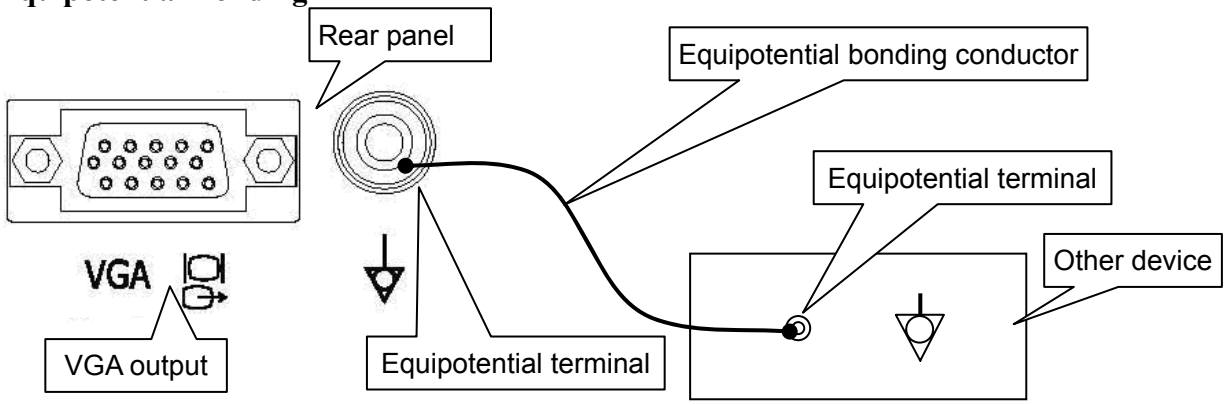


Figure 4-8 Equipotential Bonding

Any use of other devices with the system is at the user's risk and may void the system warranty. In order to fulfill IEC/EN 60601-1-1 requirements, connections of peripheral equipment to the DUS 3 VET must adhere to one of the following conditions:

- The peripheral equipment itself is a medical device approved according to IEC/EN 60601-1.
- Non-medical peripheral equipment approved according to any other EN or IEC standard must use the following setup for connection:
  - Connect the DUS 3 VET to an independent protective earth terminal with an earth wire connection to the ultrasound system's Equipotential Connector. Ensure that the protective earth wire is connected to a qualified protective earth connection independent of the existing system's earth connection (via the power cable).
  - The peripheral equipment is located at least 1.5 meters (1.8 meters in Canada and the U.S.A) outside the patient environment. A patient environment is defined as the area in which medical examination, monitoring, or treatment of the patient takes place.
  - The peripheral equipment is connected to a main outlet outside the patient environment but still within the same room as the ultrasound system.

WARNING

1. Equipotential bonding: When the device is running with other instruments jointly, consideration should be given to equipotentiality.
2. Doctors and patients might be exposed to the hazardous and uncontrollable effects of compensating current caused by unbalanced equipotentiality between indoor medical device and touchable conducting parts. The safest solution is to build a unified equipotential network, to which the medical device is connected, using an angular plug.

Printer Installation

This system supports video printer and USB printer.

- To install the video printer:

1. Power off the main unit and the printer.
2. Connect the VIDEO IN (video input) of the video printer with the VIDEO OUT (video output) of the main unit.
3. Connect the REMOTE of the video printer with the REMOTE of the main unit.
4. Power on the main unit and run the printer.

◆ To install the USB printer:

1. Power off the main unit and the printer.
2. Connect the printer with the main unit by using a USB cable.
3. Power on the main unit and run the printer.

NOTES:

1. DUS 3 VET can identify printers that are supported by the system and the printer can automatically work normally after it is successfully connected.
2. For the layout of the connecting ports, see *figure 2-2 Rear Panel Diagram*.
3. If you want to use the multiple portable socket-outlet to supply power to the whole DUS 3 VET system, you are suggested to calculate the system power consumption when building a DUS 3 VET system so as to match the system power consumption with the power sustained by the Multiple portable socket-outlet.

Chapter 5 System Control

5.1. Powering On / Off the Device

◆ To power on the device

Before powering on this device, check as below:

1. Check all the cables and make sure there is no scrape or crack.
2. Check the control panel and the monitor and make sure there is no crack.
3. Check the probe and the connection and make sure there is no scrape or crack.
4. Check the power socket and the switch and make sure there is no damage.

To power on:

1. Connect one end of power cable to the rear panel of the device, and the other end to the standard three-pin power supply socket.
2. Switch on, and then the power indicating light on the panel is on, and a startup interface appears.

◆ To shut down the device:

After using it, switch off power supply. The power indicating light on the panel is off.

NOTE:

Please unplug the AC power cord from the power socket if the device is to remain idle for a long time.

CAUTION

1. You are forbidden to unplug or plug the power cord before switching off the system.
2. Wait approximately five seconds between powering the system off and then on again. This allows the system to complete its shutdown sequence.

◆ To restart the device:

If there is any trouble described as below, please switch off the device and then power on the device to restart.

1. The device displays wrong information and it lasts for a long time.
2. The device displays abnormally.
3. The device can not execute an operation.

5.2. Examining

Apply an appropriate amount of coupling gel (medical ultrasound coupling agent) to the body area to be examined, and then contact the area with the acoustic window of the probe firmly. A cross-sectional image of tissues is displayed on the screen. Adjust the **brightness, contrast, gain, TGC, acoustic output, dynamic range,** and **focus combination** properly. Adjusting the monitor's contrast and brightness is one of the most important factors for good image quality. If theses controls are set incorrectly, the **gain, TGC, dynamic range, focus combination and even acoustic output** may have to be changed more often than necessary to compensate. Meanwhile, properly move the probe to obtain an optimal image of the target area. Or if necessary, adjust **sweeping speed** to get satisfying images in the M-mode.

CAUTION

1. Please be gentle when contacting the target area with a probe. This is to protect the probe from being damaged or the patient from being disturbed.
2. Please choose a proper probe for the target area with an appropriate frequency to begin the diagnostic operation.
3. Adjust the total gain (Gain) knob slowly.

5.3. Screen Layout

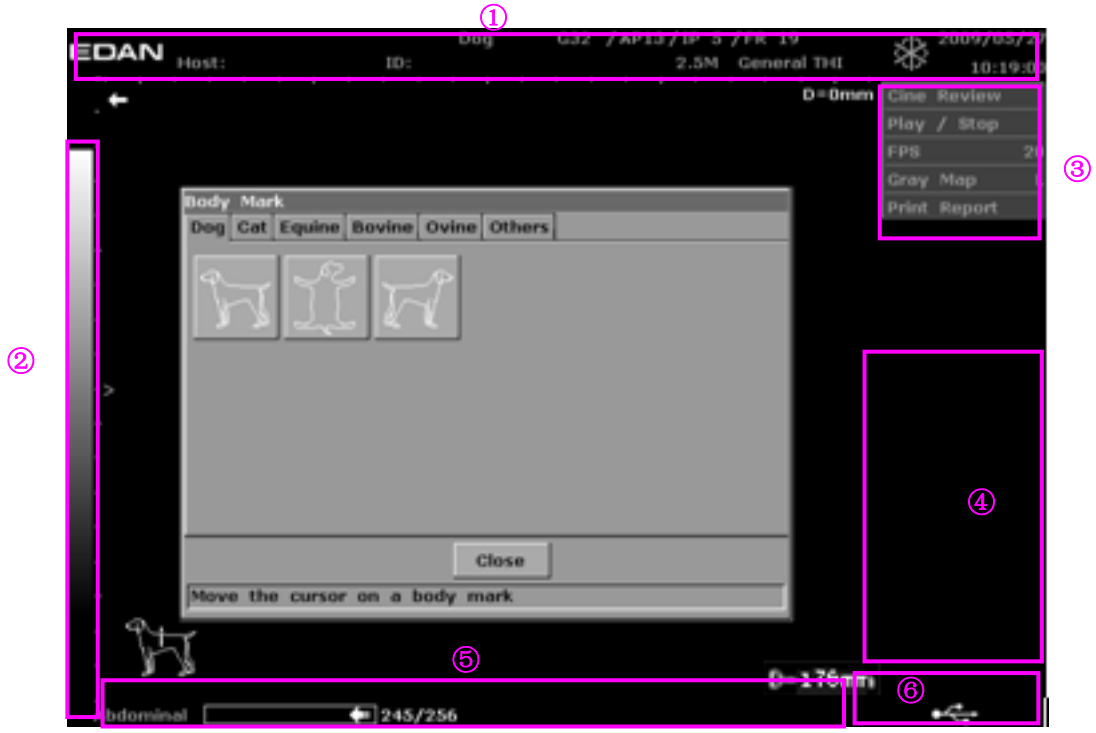


Figure 5-1 Typical Image Screen

①. Top status bar: logo image, hospital name, patient Information, system date and time, major parameter such as, G (gain), AP (acoustic power), FR (frame rate), probe model, probe frequency, THI, TSI, etc.

②.Gray map bar
③.System menu
④.Result area
⑤.Bottom status bar: examination type, operation prompt, etc.
⑥.Bottom right corner: display the state of USB

5.4. Control Panel

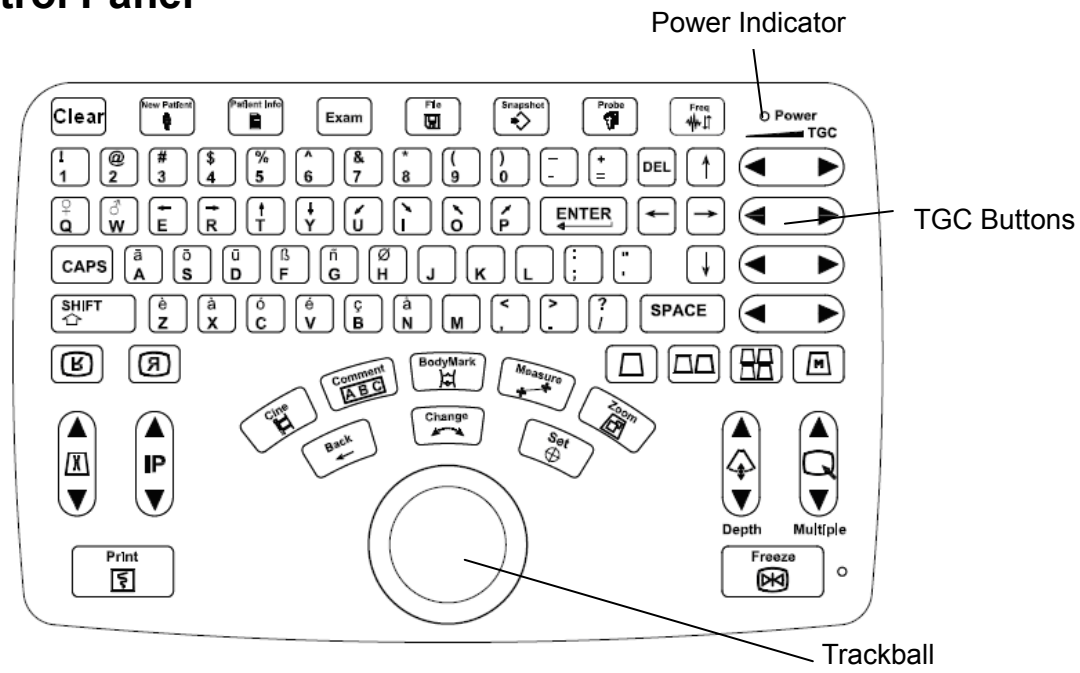


Figure 5-2 Control Panel Schematic Diagram

5.4.1. Trackball

The trackball is easy and convenient to operate. It can achieve the following functions:

- Move the measurement cursor during measurement.
- Move to select menu items in menu-based operations.
- Move the comment cursor in the comment status.
- Move the M Mark in the B/M-mode.
- Move the reference line in the B mode (biopsy function).
- Realize single frame playback in the frame-by-frame playback status.
- Move the zoomed window in the zoom status.

NOTES:

1. Please be gentle when running the trackball.

2. Please keep the surface of trackball clean.

5.4.2. "0~9" Numeric Keys

Numbers are used for time calibration, data settings, age notation, and comment adding etc.

5.4.3. Alphabetic Keys

The system supports some language-specific characters through the use of SHIFT with a combination of keys on the keyboard. Press any of these keys in the annotation mode and comment mode to display the corresponding character on the cursor position.

German Characters

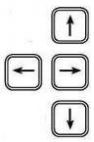
Symbol	Key Combination
ä	SHIFT-A
ö	SHIFT-S
ü	SHIFT-D
β	SHIFT-F
ñ	SHIFT-G
ø	SHIFT-H

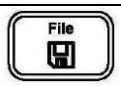
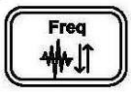
French Characters

Symbol	Key Combination
è	SHIFT-Z
à	SHIFT-X
ó	SHIFT-C
é	SHIFT-V
ç	SHIFT-B
å	SHIFT-N

Table 5-1 German and French Characters

5.4.4. Function Controls

Key	Description
	Space key Press this key in the annotation mode and comment mode to introduce a blank space on the cursor position.
+ Alphabetic key combination Press **SHIFT** and alphabetic key corresponding language's special character.	
	Alphabetic Shift key It is used to shift the characters between lowercase and uppercase.
	Entering key In annotation mode and comment mode, press this key to move the cursor to insert a blank line.
	Delete key In annotation mode and comment mode, press this key to delete text word by word.
	Arrow key In annotation mode and comment mode, press these arrow keys to move the comment cursor.
	Press it to clear all the measurements, calculations, comments, or body marks that are on the screen.

	New Patient key Press this key to cancel all the recent patient data, comment, measurement, calculation and worksheet, except saved images.
	Patient information annotation key Press this key to open or to close the Patient Data Input Dialog box.
	Examine Menu key Press this key to display or to exit the examination type menu.
	System Control key Press this key to enter or to exit the file management system; Reference *Section 6.8, File Management.* Or to do the presetting. Reference *Section 5.7, Preset.* When entering the presetting menu, you can not use other function keys.
	Probe Switch key Diverse probes are available for this device. Press this key to select a proper type of connected probe with the corresponding information in the top right corner. Reference *Figure 5-1 Typical Image Screen*.
	Frequency Shift Key Press this key to shift to the proper operating frequency for the activated probe. When you change the frequency, the G changes simultaneously.
	Image up/down Flip key Press this key to flip the image vertically.
	Image left/right Flip key Press this key to flip the image horizontally.
	Cine key In freezing mode, press this key to enter or exit the frame-by-frame cine mode.
	Comment key Press this key to activate or exit the annotation function.

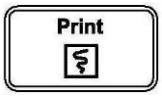
	Body Mark Key Press this key to activate or exit the body mark function. It is to indicate the examine position and the scan direction.
	Measure key Press this key to activate or exit the measurement function.
	In the real-time status, press this key to activate a zoom window in the middle of the image, you can move it to the desired area with the trackball and adjust magnification of the zoom window by pressing the **Multiple**. Then press **Set** to display the zoomed image, and then roll the trackball to move the zoomed image
	Back key In generic measurement measurement status, press this key to return to previous operation. In comment mode, press the key to delete the entered text one by one. In parameter setting status, press the key to decrease the parameter value.
	Change key This key has dual functions. In measuring status, you can press **Change** once to change the settled point and the active point. In ellipse measurement, you can press it to change the long axis and short axis. In annotation status, press this key to display the comment library.
	Set key Press this key to confirm the selection of a specific function or command. Use this key to anchor calipers, select a menu item or image graphics. Or press it to increase the parameter value in the parameter setting status.
	Freeze key Press this key to switch between the frozen and real-time states. When an image is frozen, the system inserts " ❄ " next to the system time clock and the clock pauses. When unfreezing the system, all the measurements, calculations, body marks, and comments are erased.
	Print key Press this key to do the video printing.
/	Footswitch Pedaling on the footswitch is equivalent to pressing **Freeze**.

Table 5-2 Function Controls

5.4.5. Comment Function

The comment library is for positions and anatomical structures.

To add a comment:

➢ To add a comment by using the keyboard:

1. Press **Comment**, and there is a cursor "l" displayed in the image area for annotating;
2. Enter text by using the keyboard;
3. Press **Set** to complete the comment.

➢ To add a comment by using the comment library:

1. Press **Comment**, and there is a cursor "l" displayed in the image area for annotating;
2. Press **Change** to display the comment library.
3. Highlight a comment in the comment library, and press **Set** to confirm the choice and complete the comment.

To add an arrow:

1. Press **Comment**, and there is a cursor "l" displayed in the image area for annotating;
2. Press **Set** to display an arrow;
3. Move the trackball to move the position of the arrow, press the **Multiple** buttons ▲ and ▼ to adjust the arrow direction;
4. Press **Set** to set the position of the arrow.

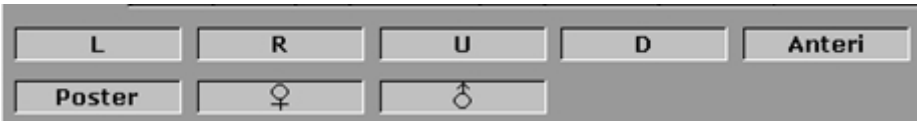
To move a comment:

1. Move the cursor to a comment, and there is a pane around the comment;
2. Press **Set** and move the cursor to a new position;
3. Press **Set** to confirm the new position.

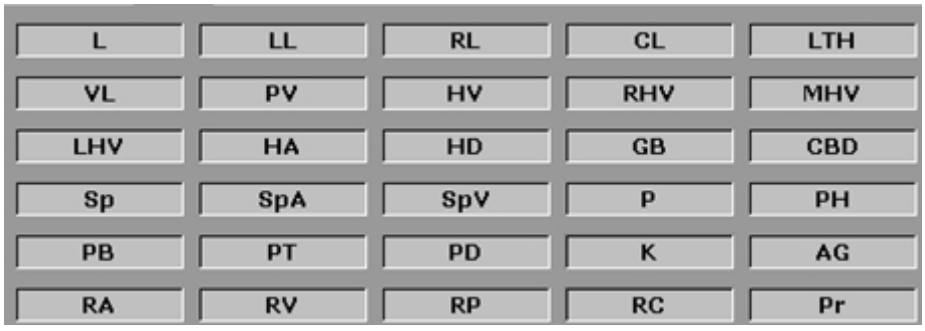
To delete a comment:

During commenting, you can use **DEL** to cancel the undesired text word by word, or you can use **Back** to cancel the undesired text one by one.

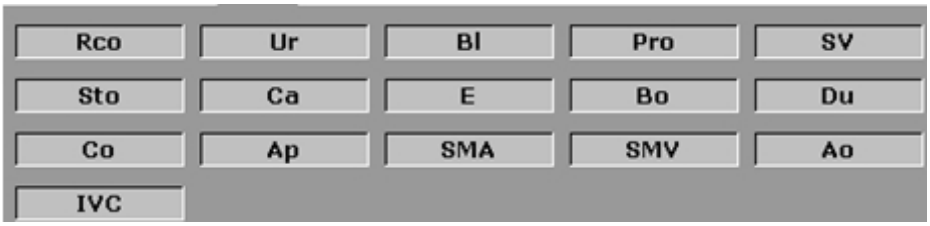
The comment library is shown below:



Generic

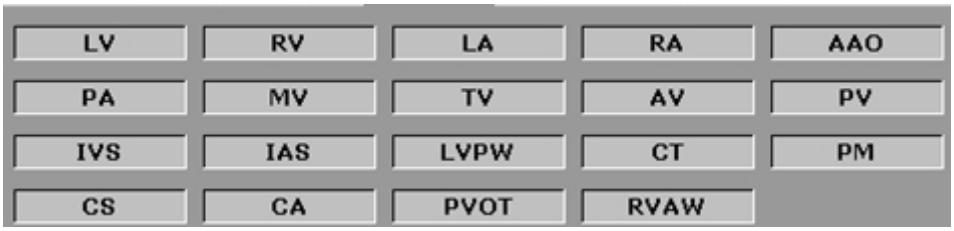


Abd 1

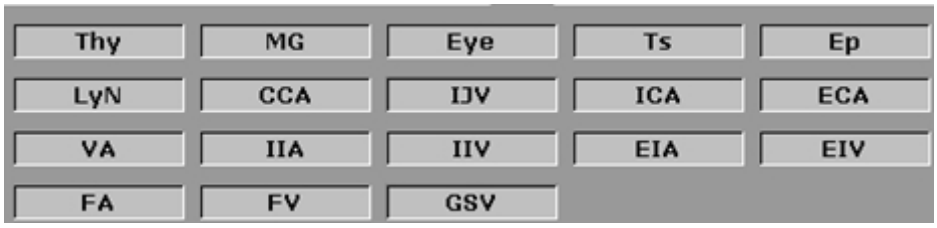


Abd 2

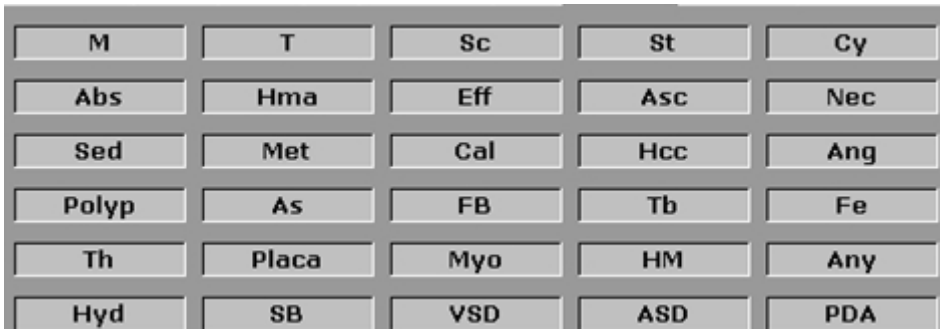
OB



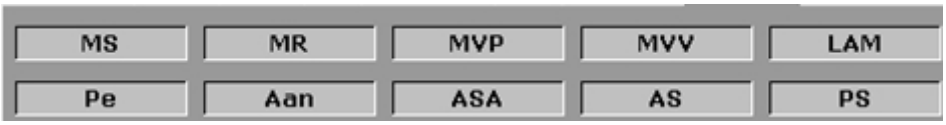
Cardiac



Sml



Lesion 1



Lesion 2

Figure 5-3 System-defined Comment Library

5.4.6. Body Mark Function

To add a body mark:

1. Press **Body Mark**, to display the body mark dialog box.
2. Highlight a body mark in the body mark dialog box, and press **Set** to confirm the choice to add the body mark. The selected body marks are displayed in the bottom left corner of the screen.

Reference *Figure 5-1 Typical Image Screen.*

3. After adding a body mark, use the trackball to move the position of the probe, and press the **Multiple** buttons ▲ and ▼ to adjust the direction of the probe.
4. Press **Set** to complete adding the body mark.

To move a body mark:

1. Move the cursor to a body mark, and there is a pane around the body mark;
2. Press **Set** and move the cursor to a new position;
3. Press **Set** to confirm the new position.

Body mark dialog box has six tabs and 18 types, as shown below:

Dog

Cat

Equine

Bovine

Ovine

Others

Figure 5-4 Body Marks

5.4.7. Adjustment Controls

Focus Position adjustment button

Press the button to shift the position of the current focus. 16 segments of the adjustable electronic focus are provided by the device. By adjusting the focal point, a clear image can be obtained. The current focal point is as shown in the FOCUS position on the left of the screen.

Image Processing adjustment button

Press the button to do the image processing that has 8 levels, ranging from 0 to 7.

Depth adjustment button

Press this button to adjust the scanning depth, in increments of 10 mm. The current depth is displayed in the bottom right corner of the image.

Multiple function button

This button has three functions:

- In real-time mode or frozen mode, press **Zoom**, and the system displays a zooming window in the middle of the image. You can roll the trackball to move the zoom window to the desired area and press the **Multiple** buttons ▲ and ▼ to adjust the magnification. In frozen mode, 4 magnification levels are available: 100%, 178%, 400% and 1600%. In real-time mode, 8 magnification levels are available: 100%、144%, 196%, 256%, 400%, 576%, 900% and 1600%. Press **Set** display the zoomed image, and then roll the trackball to move the zoomed image.

  NOTE: Magnification function is only available in B-mode and 2B-mode

- When a body mark is added, the rotation function is automatically activated. Press the **Multiple** buttons ▲ and ▼ to adjust the scanning direction.

- When an arrow is added, the rotation function is automatically activated. Press the **Multiple** buttons ▲ and ▼ to adjust the arrow direction.

Adjustment knobs near the screen:

- Contrast: rotate this knob to adjust the contrast.
- Brightness: rotate this knob to adjust the brightness.
- Gain: rotate this knob to adjust the total gain (overall gain), 0 ~ 130, in increments of 2.

Time Gain Compensation (TGC) buttons:

Press the buttons to adjust the TGC. Press the upper buttons to adjust the near field gain, and the lower buttons to adjust the far field gain; press the right buttons to increase TGC, and press the left buttons to decrease TGC.

The system displays a graphics representing the TGC curve on the image screen, as shown below.

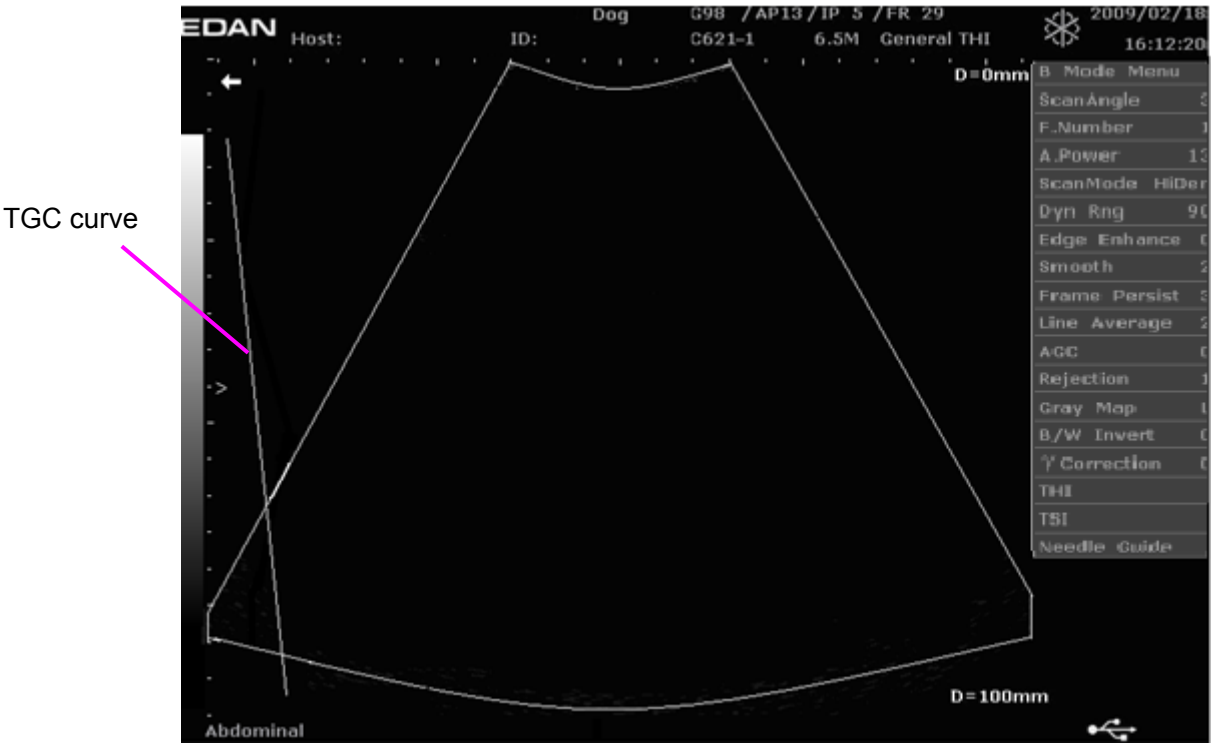


Figure 5-5 TGC Curve

5.4.8. Imaging Functions

B-mode Imaging Control

Press this key to enter the **B-mode**. The system displays a single real-time **B-mode** image.
B indicates brightness, or two-dimensional (2D) gray scale imaging.
To access B-mode from another imaging mode:
Press the B control, and the system displays a single real-time B-mode image.

NOTE:

To return to a real-time B-mode image from any imaging mode, press the B control. This also deletes all measurements, calculations, comments, and body marks that are displayed on the screen.

There is a reference line in the single B mode. Press **SHIFT+CAPS** to display or to hide the reference line. When the reference line is displayed, press **Set** to set it's position.

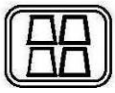
NOTE: The reference line will not be displayed after 90°rotatation or magnification.

To exit B-mode, press any other mode control.

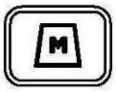
2B-mode Imaging Control

This key has two functions:

- Press this key to enter the **2B-mode**.
- Press this key to active one of the dual images. The probe direction of the activated image is brighter than that of the frozen image.

 **4B-mode Imaging Control**

- Press this key to enter the **4B-mode**. The system divides the image area into four quadrants: the first quadrant is on the top left, the second on the top right, the third on the bottom left, and the fourth on the bottom right.
- Press it repeatedly to active one of the four images. The probe direction of the activated image is brighter than the direction of the frozen images. The four images are obtained respectively and only one image at a time is displayed in real time.

 **B/M-mode and M-mode Display Control**

Press to cycle between the B/M mode and the M mode.

Press it once to enter B/M mode, the B mode and M mode images are displayed on the screen at the same time（Abbreviated as **B/M** or **B+M**）. There are four display modes available: The left image is a real-time image of B mode, while the right image is a real-time image of M mode; The left image is a real-time image of M mode, while the right image is a real-time image of B mode; The upper image is a real-time image of B mode, while the down image is a real-time image of M mode; The down image is a real-time image of B mode, while the upper image is a real-time image of M mode. You can select the display modes on general presetting interface. There is a line constituted by points with regular spacing on **B-mode** image, which is called the M Mark. Roll the trackball to move the M Mark. Press **Set** to locate the M Mark.

Press a second time to enter the M mode. It displays an M-mode sweep. The slope of this mode has four options: 0, 1, 2 and 3.

5.4.9. Additional Control Functions

The DUS 3 VET also provides the following additional control functions, which are available in status menus.

Control function	Description
Scan Angle (sector angle/ scan width)	Adjust the sector angle for curve transducers, and the scan width for linear transducers.
F. Number	Adjust the focus number.
Scan Mode	Select the scan mode, High density or High FPS (frame rate, in frames per second)

Dynamic Range	Control the overall contrast resolution of B-mode and M-mode images.
Edge Enhance	Improve the contour enhancement of the image for distinguishing the edges of a structure in B-mode.
Smooth	Adjust the smooth level.
Frame Persist	Select the number of frames for frame averaging.
Line average	Adjust the line average level.
AGC	Adjust auto gain control.
Rejection	Adjust the rejection level.
Gray map	Select the post-processing gray curve map.
B/W Invert	Set the color to black or white.
90°Rotate	Rotate the image by 90 degrees.
γ correction	Adjust γ correction.
THI	Select the THI type, tissue harmonic imaging / general.
TSI	Select the TSI type, general/muscle/fatty/fluid.
Needle guide	Perform the biopsy function, and adjusts needle guide (guide line, angle, etc.)
Breakstone	Perform the breakstone guide function, displaying a breakstone guide line in the middle of the screen.
Sweep speed	Adjust the scrolling speed level of the M-mode and PW mode sweep.
M mark	Adjust the M Mark of the B/M mode.
A power	In B/M mode, click it to activate the M mark after fixing the M mark.

Table 5-3 Additional Control Functions

These functions can be set using **Set** and **Back**.

5.5. Menu

Menus are displayed on the right of the screen. Only one menu can be activated at a time. The types are as shown below:

System status menu

In **B-mode** or **B/M-mode**, the system status menu provides information about the current imaging mode. In 2B and 4**B-mode**, it indicates the status and parameters of the active image. In **M-mode**, it indicates the status and parameters of M sweep. The following are the system status menus of B-mode, B/M-mode, and M-mode respectively.

Figure 5-6 System Image Menu

Measurement and calculation menu

Executes an operation. For instance, begin a distance measurement, and then the corresponding measurement cursor is displayed. The following is the B-mode generic measurement and calculation menu.

After entering B-mode, press **Measure** to display the menu below.

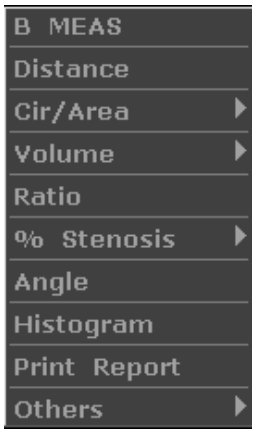


Figure 5-7 B Mode Generic Measurement and Calculation Menu

Secondary menu

The symbol "►" indicates that there is a secondary menu associated with the menu option. Roll the trackball to highlight the menu option with "►", the system displays a secondary menu for the selected option.

Example: The secondary menu of **Cir/Area** contains **Ellipse** and **Trace**, as shown below.

After entering B-mode, press **Measure** to display the menu below, and highlight the option **Cir/Area**, the system displays the secondary menu **Ellipse** and **Trace**.

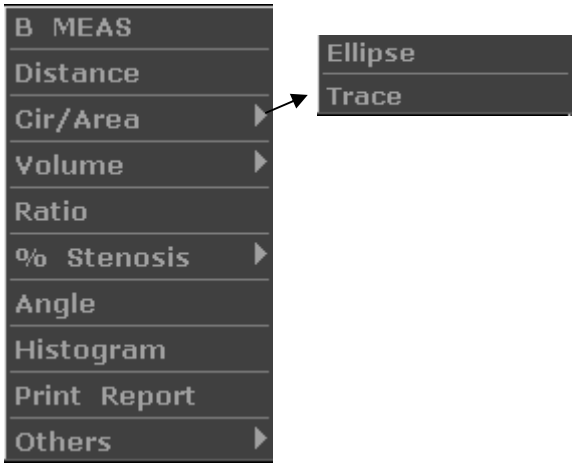


Figure 5-8 Secondary Menu

Figure 5-9 File Menu

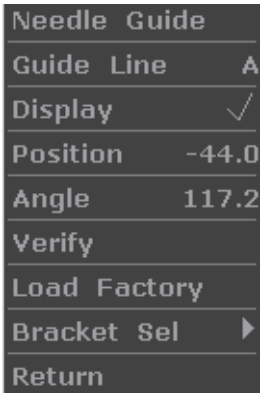


Figure 5-10 Needle Guide Menu

Hiding and revealing the Menu

Press the **Shift** and **M** buttons at the same time, the current menu will be hidden (except the presetting menu). Press **Shift** and **M** again, the menu will be revealed.

5.6. Dialog Box Operation

The dialog box may have a few tabs, as shown below. You can select one tab at a time with trackball and **Set**. Also, you can modify the parameter following the prompt instruction, and then highlight **OK** and press **Set** to save the modified parameters and close the dialog box; or highlight **Cancel** to give up the modification and close the dialog box directly.

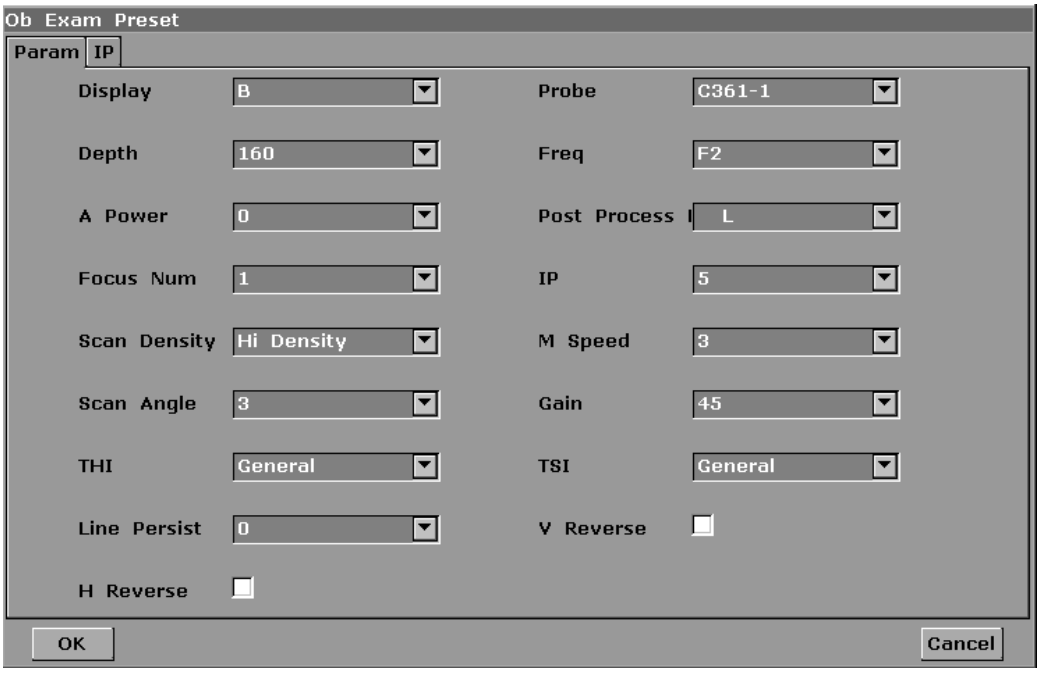


Figure 5-11 Obstetrics Examination Preset Dialog Box

5.7. Presetting

5.7.1. Entering and Exiting

Enter presetting:

1. Press **File**, highlight **Preset**, and then press **Set** to display the preset menu, as shown below.

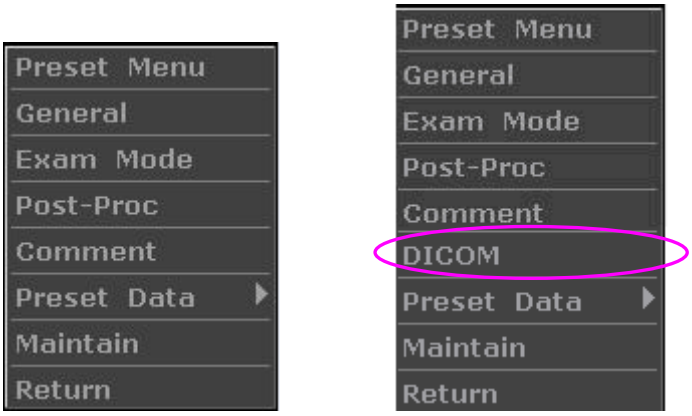


Figure 5-12 Preset Menu (the left—with no DICOM installed, and the right—with DICOM installed)

2. Roll the trackball to highlight one of the options and then press **Set** to display the menu of the corresponding option.

To exit presetting:

Highlight **Return** and press **Set,** the system exits the presetting mode and runs with the new modified parameters. Or the system runs with the new modified parameters after being restarted.

5.7.2. Displaying / Modifying the Preset Parameter

Select a type of presetting and press **Set** to display the corresponding dialog box, and you can modify the parameter following the prompt instruction.

Reference *Section 5.6, Dialog box operation*.

5.7.3. General Presetting

1. In preset menu, move the cursor to highlight **General Preset** and press **Set** to display general presetting dialog box, as shown below.
2. Roll the trackball to highlight an item and then press **Set**. Then use the keyboard to enter text.

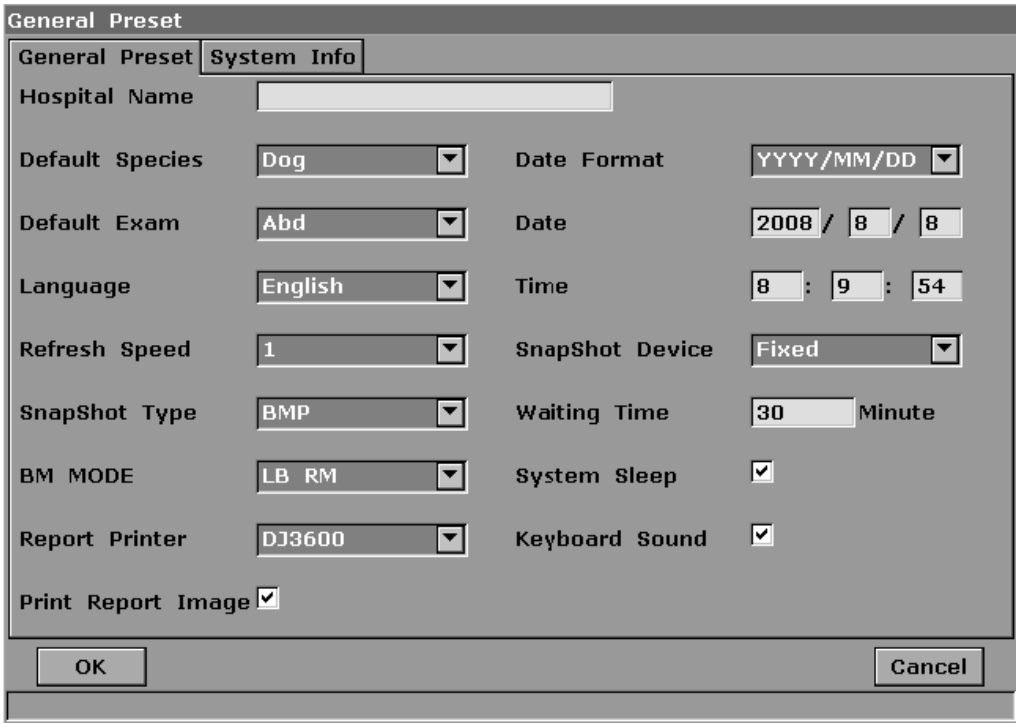


Figure 5-13 General Presetting

Item	Setting	Allows you to
Hospital Name	Input freely	Set hospital name displayed on the top left of the screen and diagnosis report, with a maximum of 32 characters.
Default Species	Dog, Cat, Equine, Bovine, Ovine or Others.	Preset the species type.
Default Exam	Abdomen, obstetrics, small parts, or cardiology.	Preset the examination type.
Language	Chinese, English, French, German, Spanish, Russian, etc. (The language options varies with language software installed.)	Set the overlay language
SnapShot Type	BMP/JPG/FRM/DCM (if DICOM is installed)	Set the storage file format type of snap shot.
BM Mode	LB RM/LM RB/UB DM/UM DB	Set the display mode of BM mode images
Report Printer	DJ 3600, DJ4100, DJ Generic VIP, LJ Mono, DJD2600	Select the printer type, see table 5-5 for the corresponding printer model.
Print Report Image	Select whether to print image in report.	Select whether to print image in report when printing by USB printer.
Keyboard Sound	√ / Null	Turn on or off the keyboard sound.
Date Format	Set freely	YYYY/MM/DD, MM/DD/YYY or DD/MM/YYYY.
Date	Set freely	Set the system date.
Time	Set freely	Set the system time, format: H/M/S.
SnapShot Device	USB-Disk/Fixed	Set the storage device of snap shot.
Waiting time	Set freely	Set the system waiting time to enter sleep mode (5-60 min).
Refresh Speed	1~10	Set the grade of glint speed of system dormancy.
System Sleep	√ / Null	Select whether the device enters sleep mode when no operation is done for certain minutes.

Table 5-4 General Presetting Information

Priter type	Printer model
DJ 3600	HP DeskJet D2368 HP DeskJet D2468
DJ 4100	HP DeskJet D4368
DJ Generic VIP	HP DeskJet D2568 HP DeskJet F2418 HP DeskJet F2488 HP D5568 HP2010

	HP2050 HP1050
DJD2600	HP2668 HP109A
LJ Mono	HP LaserJet P2015 HP LaserJet P2035

Table 5-5 Presetting a Report Printer

5.7.4. Presetting Exam

Examination types include abdomen, obstetrics, small parts, and cardiology.

In the Exam Mode Preset menu, select a species and an exam mode, and then click on the **Modify** to display the presetting dialog box.

Figure 5-14 Exam Mode Preset Dialog Box

Parameter Tab

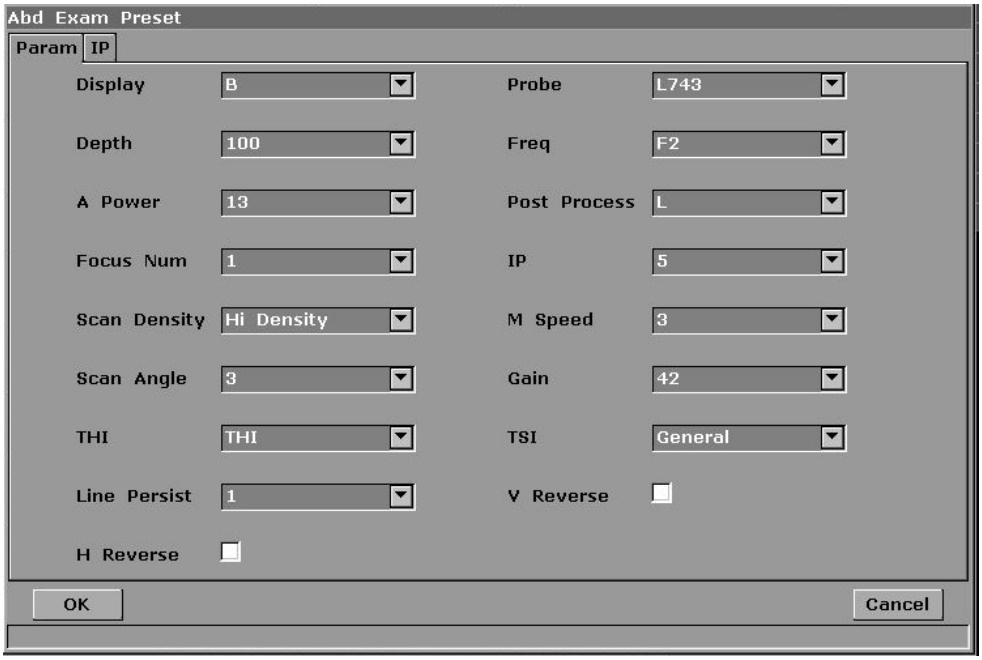


Figure 5-15 Abdominal Presetting -- Parameter Tab

Item	Setting	Allows you to
Display	B, M, B+B, 4B, B+M	Set display mode type.
Depth	19 mm~245 mm (C611)	Set examine depth.
A Power	0~15	Set acoustic power, 16 levels.
Focuses Num	1/2/3/4	Set the number of focuses.
Scan Density	High density/high frequency	Set scanning density.
Scan Angle	0/1/2/3	Set scanning angle.
THI	Tissue harmonic imaging / General	Set THI.
Line Persist	0~7	Set image line correlation.
H Reverse	√ / Null	Set the attribute of Horizontal reversal.
Probe	Display all the probe type this device supports	Set the probe type to use.
Freq	F1/F2/F3/F4/F5	Set the frequency of probe.
Post Process	Gray map (L, A, B, C, D, S)	Select a default gray map.
IP	0~7	Set the image parameter.
M speed	1/2/3/4	Set the M-mode sweeping speed.
Gain	0~130	Set the gain of image, in 2 increments.
TSI	General/muscle/fatty/fluid	Set the type of TSI.
V Reverse	√ / Null	Set the attribute of Vertical reversal.

Table 5-6 Abdominal Presetting Information – Parameter

IP Tab

NOTE: IP----Image Parameter

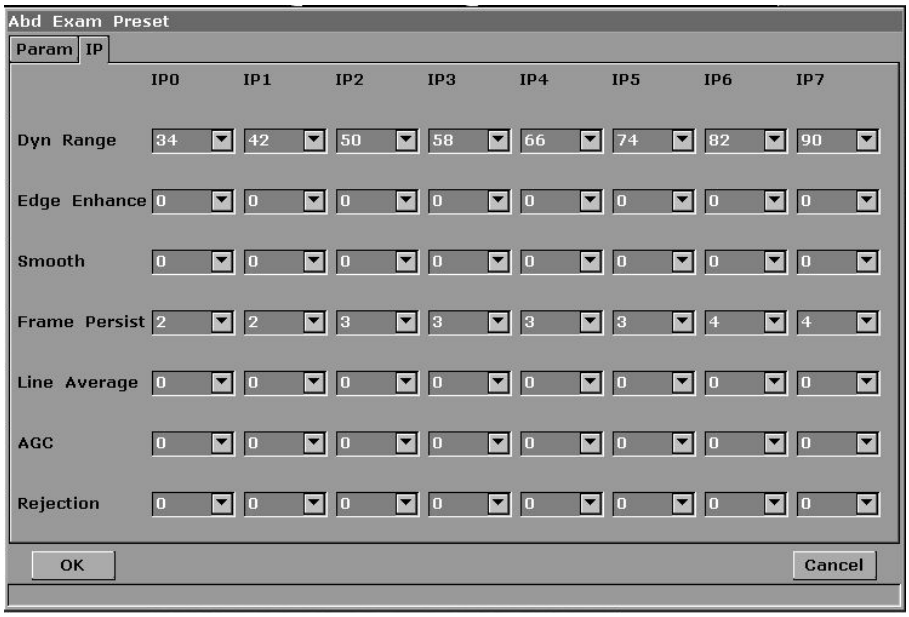


Figure 5-15 Abdominal Presetting -- IP Tab

Item	Setting	Allows you to
Dynamic Range	30~150 dB	Select the default dynamic range for the examination, in decibels (dB). During imaging, the dynamic range can be adjusted in 4 dB increments to the image.
Edge Enhancement	0~7	Select the default amount of edge enhancement to be applied to the image.
Smooth	0~7	Set image smoothing.
Frame Persist	0~7	Set image frame correlation.
Line Average	0~7	Set image line softening attribute.
AGC	0~3	Set Automatic Gain Compensation.
Rejection	0~7	Set image noise restrain attribute.

Table 5-7 Abdominal Presetting Information – IP

5.7.5. Presetting Post Processing

The preset items include gray map, rejection and gamma correction.

In the preset menu, roll the trackball to highlight menu **Post-Proc** and press **Set**, and then display post processing presetting dialog box, as shown below:

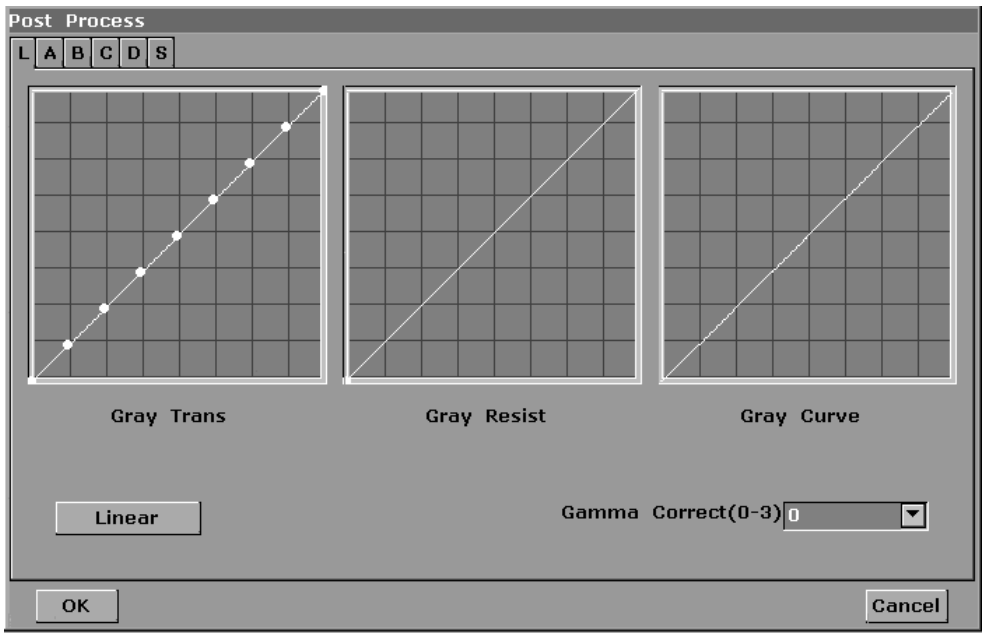


Figure 5-16 Post Processing Presetting

Gray transformation presetting

The gray transformation (Gray Trans) curve has nine infection round nodes. You can reposition them within a specific range to recalculate the curve and update the image.

To preset gray map (take map L for instance):

1. Move the cursor to one of the nine round nodes. Press **Set**, move the node with trackball to adjust the curve.

2. Press **Set** to complete the adjustment, and the Gray Curve is renewed simultaneously.
3. Adjust other nodes using the same method.
4. Roll the trackball to **Linear**, and press **Set**. Then the gray map curve turns a 45° line, and the Gray Curve is renewed simultaneously.

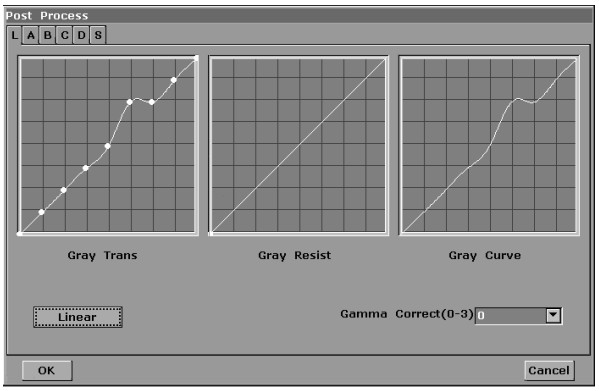


Figure 5-17 Gray Transformation Presetting

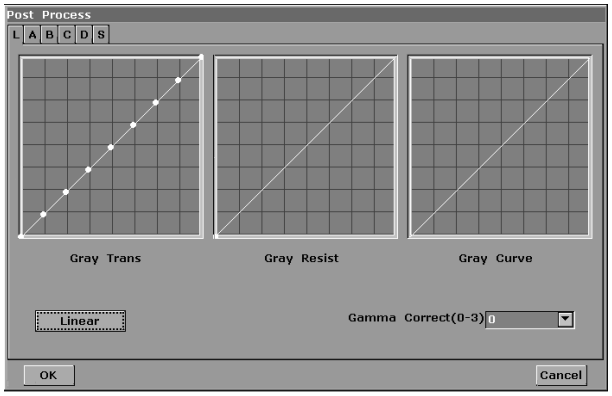


Figure 5-18 Gray Transformation Presetting ---Linear

5. Press **OK** to save the modification, or press **Cancel** to give up. At the same time, the dialog box is closed.

NOTE:

Linear is effective for changing the gray transformation curve only, having no effect on the resistance or gamma correction.

Gray resistance presetting

The gray resistance (Gray Resist) curve has one round node. You can reposition it within a specific range to recalculate the curve and update the image.

To preset rejection (take map L for instance):

1. Move the cursor to the node. Press **Set**, and move the node with trackball to adjust the gray resistance curve.
2. Press **Set** to complete the adjustment, and the result curve is renewed simultaneously.

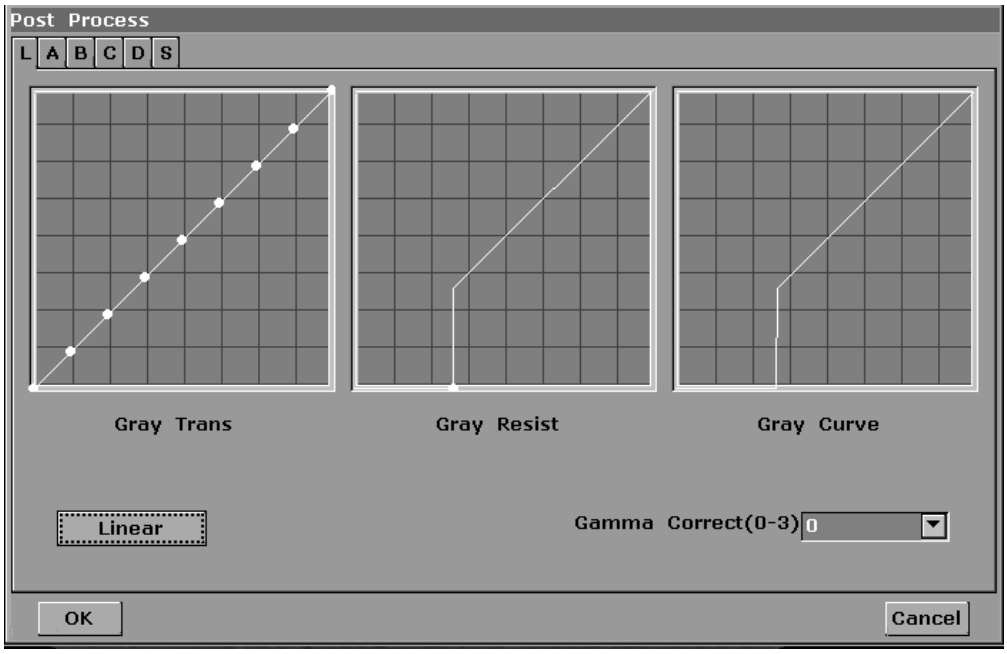


Figure 5-19 Gray Resistance Presetting

3. Press **OK** to save the modification, or **Cancel** to give up. At the same time, the dialog box is closed.

Gamma correction presetting (γ correction):

γ correction has four levels: 0, 1, 2 and 3. You can select any one of the four levels.

5.7.6. Editing Comment Library

There are eight tabs on the comment library interface: generic, abdomen 1, abdomen 2, obstetric, cardiac, small parts, lesion 1 and lesion 2. Each tab has a few sets of comments defined at factory, and you can create up to 6 user-defined comments for each tab. Creating a comment library for a patient report saves your time, especially for recurring examinations. You can quickly add a comment by using the comment library.

Operation procedure:

1. Press **File**, Roll the trackball to highlight **Preset** and then press **Set** to activate the presetting function.
2. Roll the trackball to highlight **Comment** and then press **Set**. Then the Comment Preset dialog box is displayed, as shown below:

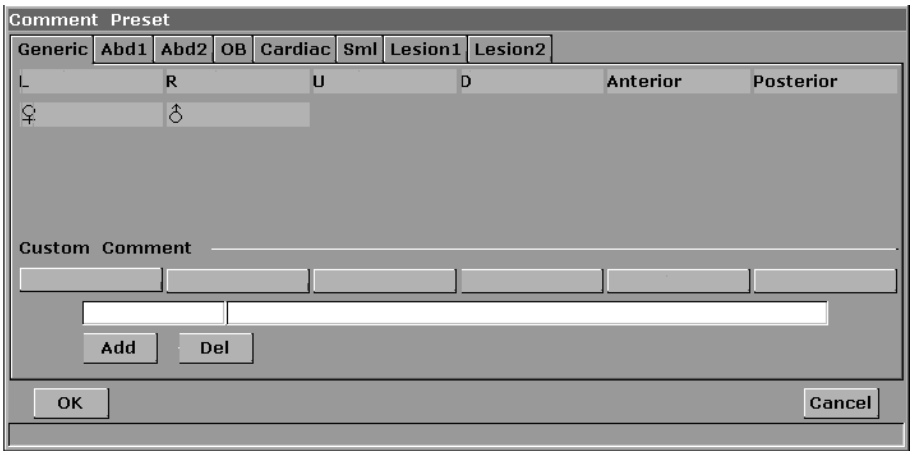


Figure 5-20 Comment Library Presetting

To create text for text list, take **Generic** for instance:

1. Press **Generic** to open the generic comment library.
2. Roll the trackball to highlight one of the custom comment, and press **Set**.
3. Roll the trackball to highlight the left side frame of User-defined, and press **Set**. Then the cursor turns to "I", as shown below. You can enter comment with the keyboard.

Figure 5-21 User-defined Comment Library

4. Roll the trackball to highlight the right side frame of User-defined, and press **Set**. Then the cursor turns to "I", as shown below. You can enter some detailed and help information about the new created comment with the keyboard.

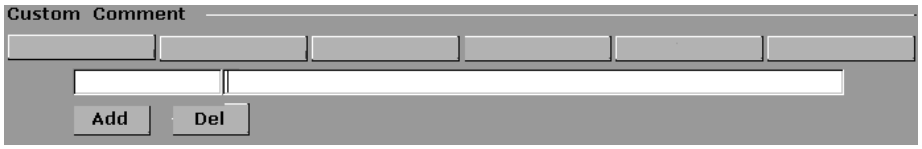


Figure 5-22 User-defined Detailed Information of Comment Library

5. Roll the trackball to highlight **Add** to add the new created comment to Generic.
6. Press **OK** to save the modification, or press **Cancel** to give up and close the dialog box.

To delete text from text list:

1. Press **Generic** to open the **Generic**.
2. Roll the trackball to highlight the created comment, and press **Set**.
3. Press **Del** to delete the created comment.
4. Press **OK** to save the modification, or press **Cancel** to give up and close the dialog box.

5.7.7. Presetting Data

The secondary menu of preset data is as shown below: Factory Default

You can use this option to return to the factory default data.

5.7.8. Presetting DICOM

If you have installed the DICOM software, roll the trackball to highlight DICOM, the DICOM presetting window displays, perform the DICOM presetting as shown below.

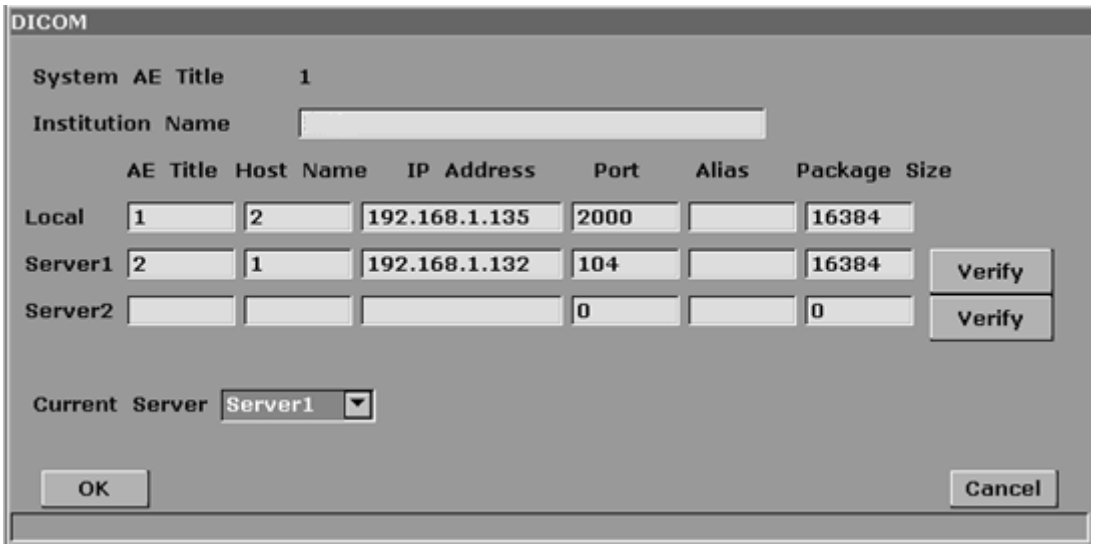


Figure 5-24 DICOM Presetting

Item	Description	
System AE Title	The same as the title set in the **AE Title** of **Local**	
Institution Name	Set the name of the institution	
Local	AE Title	Set the local AE title
	Host Name	Set the local host name
	IP Address	Set the local IP address
	Port	Set the local port
	Alias	Set the alias of the local system
	Package Size	Set the PDU transmission package size, from 4K to 64K, and the default value is **16K.**
Server 1/2	AE Title	Set the server AE title, the same as the **System AE Title** displays
	Host Name	Set the server host name
	IP Address	Set the server IP address

	Port	Set the server port
	Alias	Set the alias of the server
	Package Size	Set the PDU receiving package size, from 4K to 64K, and the default value is **16K.**
Verify	After presetting the server information, press **Verify** to verify the server's connection.	
Current Server	Choose the current server that is connected to the system.	

Table 5-8 DICOM Presetting Information

Press **OK** to save the presetting and exit, or **Cancel** to exit without saving the presetting.

NOTES:

1. Do NOT set a same IP Address for the local system and the server.
2. Ensure that you have turned on the server before verifying it.

5.7.9. Maintenance

The maintenance can be only done by the manufacturer authorized personnel.

5.8. Printing

To connect a video printer:

1. Connect the VIDEO IN (video input) of the video printer to the VIDEO OUT (video output) of the main unit.
2. Connect the REMOTE of the video printer to the REMOTE of the main unit.
3. Check the printer, referring to the printer user manual.
4. Make sure the **Report Printer** and **Print Report Image** options in the **General Presetting** window are set correctly.
5. Run the printer.

To print an image:

Press **Print** on the keyboard to print the image currently displayed.

To connect a USB printer:

1. Connect the USB printer via the USB port.
2. Check the printer, referring to the printer user manual.
3. Make sure the **Report Printer** and **Print Report Image** options in the **General Presetting** window are set correctly.

4. Run the printer.

To print a report:

1. Open and edit the report which is to be printed.
2. Press **Print** on the keyboard to print out the image.

NOTES:

1. Before printing, make sure there is enough paper for printing.
2. Before printing, make sure the presetting printer type is correct.
3. Before printing, make sure the printer power cord and the USB cable are connected well.
4. Do NOT cut off the printer power supply or the USB cable during printing.
5. If the printer can not work normally, please restart the printer and the DUS 3 VET.

Chapter 6 Operation

6.1. Selecting an Examination Type

Press **Exam** Key to select an examination type. You can change the examination type at any time by making a selection from the Exam Type menu list, as shown below. Roll the trackball to highlight an examination type and press **Set** to select.

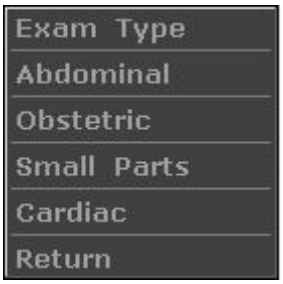


Figure 6-1 Examination Type Menu

6.2. Entering New Patient

Press **New Patient** to clear all the information, and then begin a new patient examination.

NOTE:

When you press **New Patient**, the system cancels all the recent patient data, comment, measurement, calculation and worksheet, except saved images.

6.3. Entering or Editing Patient Information

Press **Patient Info.** to activate the patient data annotation function, and then enter or edit the patient data using keyboard.

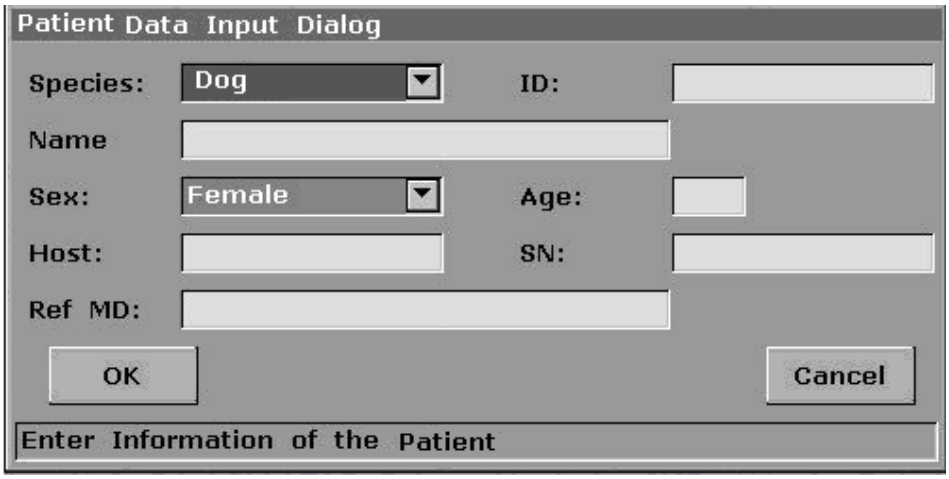


Figure 6-2 Patient Data Input Dialog Box

To switch the input focus to the next one: press **Enter**;
To exit: focus on **OK** or **Cancel**, and then press **Enter** or **Set**.

6.4. Activating a Transducer

While multiple transducers can be connected to the ultrasound system, only one can be activated at a time.

Press **Probe** repeatedly to cycle through the transducers currently connected to the system. The type of the activated transducer is displayed in the top right corner of the screen.

WARNING

For TRANSDUCER ASSEMBLIES is intended for intra-corporeal use (e.g.: V741, V561), Do NOT activate the transducers outside the patient's body.

NOTE:

You can use the preset menu to determine which transducer is activated for the corresponding examination type.

6.5. Selecting an Imaging Mode

You can select an imaging mode by pressing the key , , , , or , and then begin an examination.

Reference *Section 5.4.8, Imaging functions.*
Reference *Section 5.2, Examining.*

6.6. Measurement and Calculation

Measurement and calculation functions are contained in each examination type and imaging mode. B-mode generic measurements include distance, trace circumference, ellipse circumference, trace area, ellipse area, two-axis volume, three-axis volume, % stenosis, and angle measurements. M-mode generic measurements include distance, time, slope, and heart rate (2 cycles). You can perform the measurement and calculation in real-time/freezing/zooming/CINE Review playback state. Distance and circumference is presented in mm; area, in mm^2, cm^2, or dm^2; volume, in mm^3, cm^3, dm^3, mL or L; time in ms or s, and heart rate in bpm, etc.

To activate the measurement function, press **Measure**, and then the light is on.

There is one type of mark in B-mode measurement: "+".

There are three types of marks in M-mode measurement: "+", big "+", and a line.

The measurement results are displayed in real-time. After measurement, the outcome is displayed in Measured Results with a serial number. You can measure one to four groups of data. If you continue to measure, the earliest group is automatically covered by the newest one.

NOTES:

1. If you perform the measurement in the frozen status, all the measurements will be canceled when you unfreeze the image.
2. During measurement, press **Back** to delete the former operation.
3. After a complete generic measurement (such as Distance), press **Back** to erase a measurement at a time.
4. After a complete application measurement (such as MA), the **Back** key doesn't work.

The generic measurement and calculation include four sets of measurement calipers, four sets of ellipses, four sets of measurement results at most.

The examinations and results are as shown in table 6-1.

Examination	Specific measurement labels	Result
Obstetrics	CRL, GSD, HD, BD, HE&BD, GSD-H, GSD-V, TD, and BPD	Obstetrics report
Cardiology	LV, RV, Mitral, Aorta, etc.	Cardiac report
Small parts	None	General report
Abdominal	None	General report

Table 6-1 Examination Items and the Results

The system-defined examinations are abbreviated as follows:

Abd: Abdominal OB: Obstetrics

Sml: Small Parts Car: Cardiac

6.6.1. Generic Measurements in B Mode

The default measurement of B-mode is distance measurement. B-mode measurement menus are as shown below:

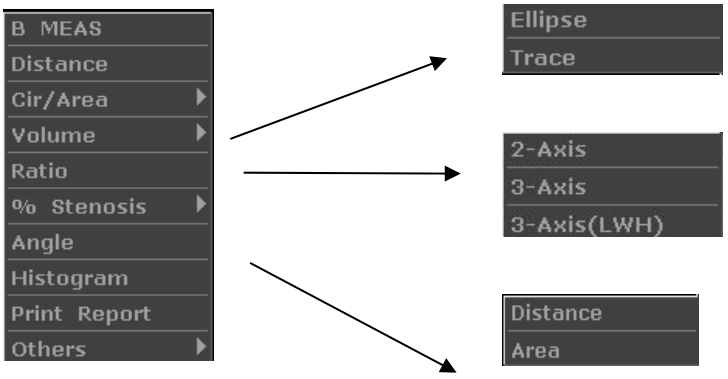


Figure 6-3 B Mode Generic Measurement and Calculation Menu

Distance To measure distance:

1. Press **Measure** to activate measurement function.

2. Roll the trackball to highlight menu **Distance**, press **Set** to activate a measurement cursor "+" on the screen.
3. Roll the trackball and press **Set** to anchor the start point.
4. Roll the trackball and press **Set** to anchor the end point.
5. Roll the trackball and press **Set** to begin a new distance measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results, as shown below.
6. Press **Measure** to finish and exit.

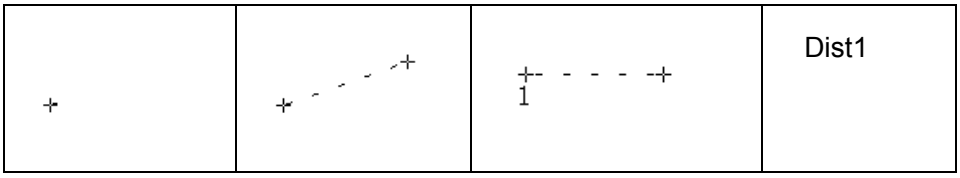


Figure 6-4 Distance Measurement and the Results

Circumference/Area

- **Ellipse Method**

To measure Circumference / Area:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **Cir/Area**. Then select **Ellipse**, and press **Set** to activate a measurement cursor "+" on the screen.
3. Roll the trackball and press **Set** to anchor the start point of fixed axis of ellipse.
4. Roll the trackball and press **Set** to anchor the end point of fixed axis of ellipse.
5. Roll the trackball, and press **Set** to define the size of the ellipse.
6. Roll the trackball and press **Set** to begin a new circumference/area measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results, as shown below.
7. Press **Measure** to finish and exit.

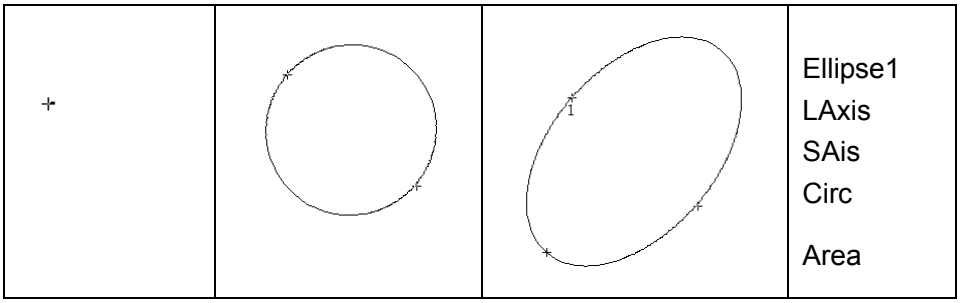


Figure 6-5 Ellipse Circumference/Area Method and the Results

- **Trace Method**

To measure Circumference / Area:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **Cir/Area**. Then select **Trace**, and press **Set** to activate a measurement cursor on the screen.
3. Roll the trackball and press **Set** to anchor the start point.
4. Roll the trackball to outline the region of interest. As you move the trackball, the system displays dots to outline the structure. To correct an error in the trace, press **Back** to move in reverse along the traced outline. Roll the trackball to move forward again. The system automatically closes the loop when the last measurement marker is moved very near to the start point. Or press **Set** to close the loop. The system draws a line from the position of the active measurement marker to the beginning of the loop.
5. Roll the trackball and press **Set** to begin a new circumference/area measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results, as shown below.
6. Press **Measure** to finish and exit.

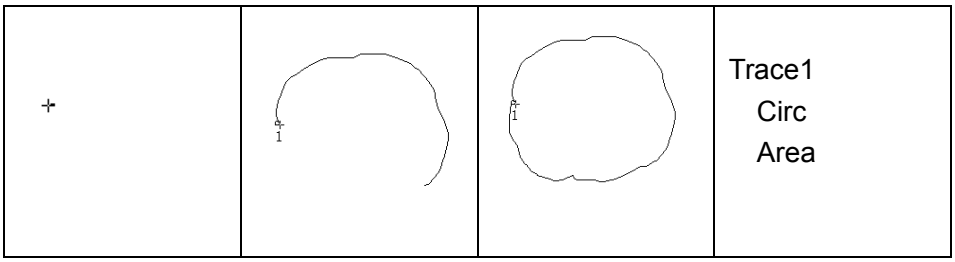


Figure 6-6 Trace Circumference/Area Method and the Results

Volume

- **2-Axis volume method**

$V= (\pi/6) \times A \times B^2$, (A: the length of major axis. B: the length of minor axis)

Two-axis volume method can be used to perform volume measurement by calculating only 1 set of measured data.

Operating Method:

The two-axis volume method is similar to the generic B-mode Cir/Area measurement ellipse method. You can measure a maximum of four groups of data.

- **3-Axis method**

$V= (\pi/6) \times A \times B \times M$,

(A: the length of major axis. B: the length of minor axis. M: the length of the third axis.)

Three-axis method can be used to perform volume measurement by calculating 2 sets of measured data, EA and the length of the third axis. To complete volume measurement, first measure EA by ellipse method, and then measure the length of the third axis in the method of generic B-mode distance measurement, and the value of volume is displayed automatically.

To measure volume:
In the **B-mode**

1. Obtain a cross-section image and freeze the system.
2. Measure the lengths of the major axis and the minor axis of the cross section with the ellipse method.
3. Unfreeze the system to acquire a new image (vertical-section image), and then freeze it.
4. Measure the length of the third axis in the vertical section image in the method of generic B-mode distance measurement. You can measure a maximum of one group of data. The outcome is displayed in Measured Results.

In the **2B-mode** or **4B-mode**
To measure volume:

1. Obtain the cross-section image and the vertical-section image.
2. Measure the lengths of the major axis and the minor axis of the cross section with the ellipse method.
3. Roll the trackball to the next image (vertical section image), measure the length of the third axis in the method of generic B-mode distance measurement. The outcome is displayed in Measured Results, as shown below.
4. Press **Measure** to finish and exit.

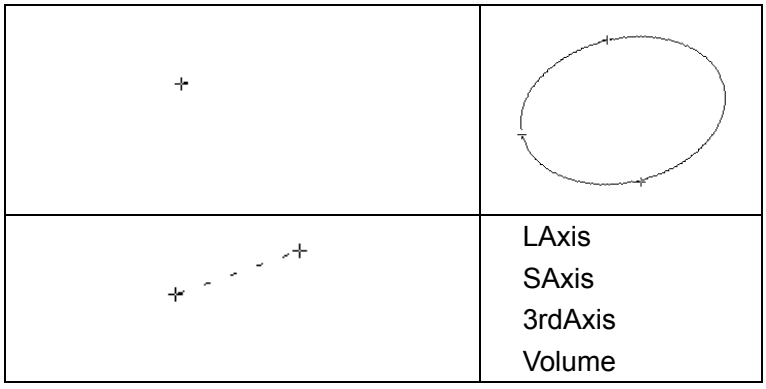


Figure 6-7 3-Axis Volume Method and the Results

- **3-Axis (LWH) method**

$V = (\pi/6) \times L \times W \times H$,

(L: the length. W: the width. H: the height.)

Three-axis (LWH) method can be used to perform volume measurement by calculating 3 sets of distance data, L, W, and H. Measure the three data in the method of B-mode generic distance measurement, and then the value of volume will be displayed automatically.

To measure volume:

In the **B-mode**

1. Obtain a cross-section image and freeze the system.

2. Measure the length and the width.

3. Unfreeze the system to acquire a new image (vertical-section image), and then freeze it.

4. Measure the height. You can measure a maximum of one group of data. The outcome will be displayed in Measured Results.

In the **2B-mode** or **4B-mode**

1. Obtain the cross-section image and the vertical-section image.

2. Measure the length and the width.

3. Roll the trackball to the next image, vertical section image, measure the height. The outcome will be displayed in Measured Results, as shown below.

4. Press **Measure** to finish and exit.

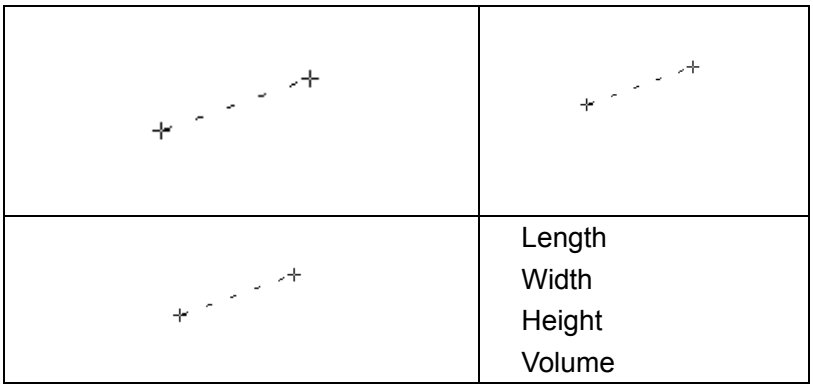


Figure 6-8 3-Axis (LWH) Volume Method and the Results

Ratio

To determine the ratio, take two measurements: A and B. The system calculates the ratio: A/B or B/A.

To measure ratio:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **Ratio**, and press **Set** to activate a measurement cursor on the screen.
3. Measure the first distance A in the method of generic B-mode distance measurement.
4. Measure the second distance B, move the cursor and press **Set** to anchor start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** once to change the settled point and the active point; if you press **Change** a second time, the system interchanges the numerator and denominator.
6. Roll the trackball and press **Set** to complete the measurement, and the calculation result is displayed in Measured Results.
7. Roll the trackball and press **Set** to begin a new ratio measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results.
8. Press **Measure** to finish and exit.

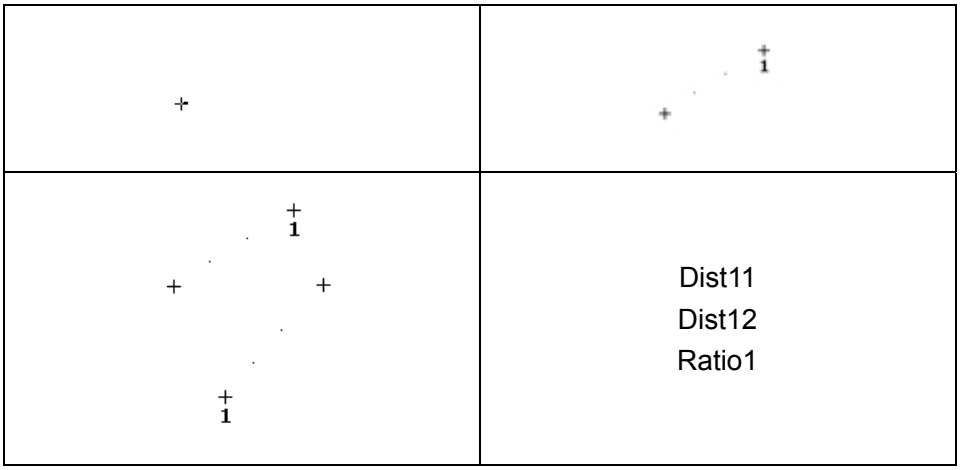


Figure 6-9 Ratio Measurement and the Results

% Stenosis

- **Distance stenosis**

To determine the distance stenosis, take two distance measurements: A and B. The system calculates the stenosis: (A-B)/A * 100%.

To measure distance stenosis:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **% Stenosis**, and select **Distance**,

and then press **Set** to activate a measurement cursor on the screen.

3. Measure the first distance in the method of generic B-mode distance measurement.
4. Measure the second distance, move the cursor and press **Set** to anchor start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** to change the start point and the end point; if you press **Change** again, the system interchanges the numerator and denominator.
6. Roll the trackball and press **Set** to complete the measurement, and the calculation result is displayed in Measured Results.
7. Roll the trackball and press **Set** to begin a new stenosis measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results.
8. Press **Measure** to finish and exit.

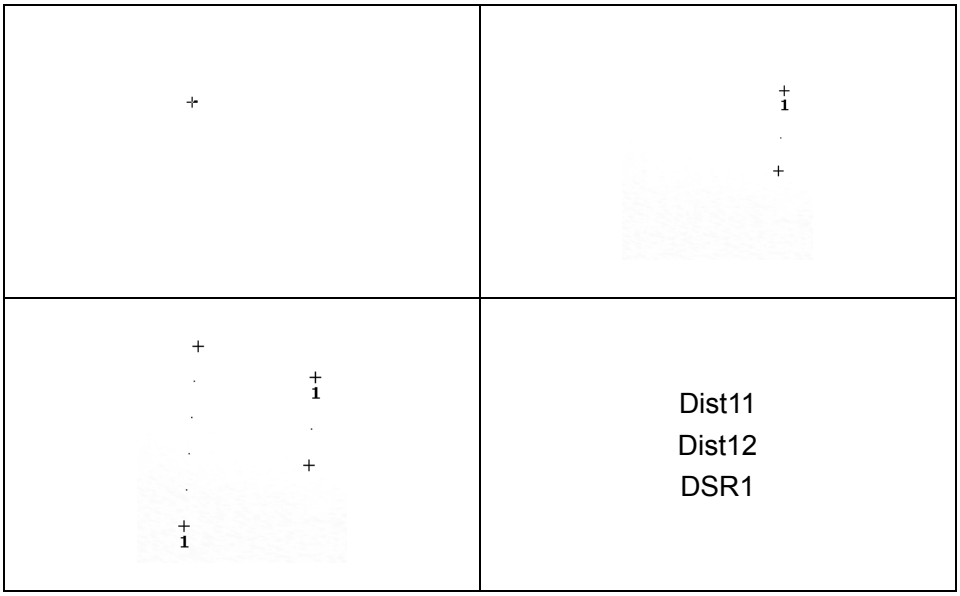


Figure 6-10 Distance Stenosis Measurement and the Results

- **Area stenosis**

To determine the area stenosis, take two area measurements: A and B. The system calculates the stenosis: (A-B)/A * 100%.

To measure area stenosis:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **% Stenosis**, and select **Area**, and then press **Set** to activate a measurement cursor on the screen.

3. Measure the first area with the ellipse method.
4. Measure the second area, move the cursor and press **Set** to anchor start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** to change the start point and the end point.
6. Roll the trackball and press **Set** to complete the measurement. You can measure a maximum of one group of data. The outcome is displayed in Measured Results.
7. Press **Measure** to finish and exit.

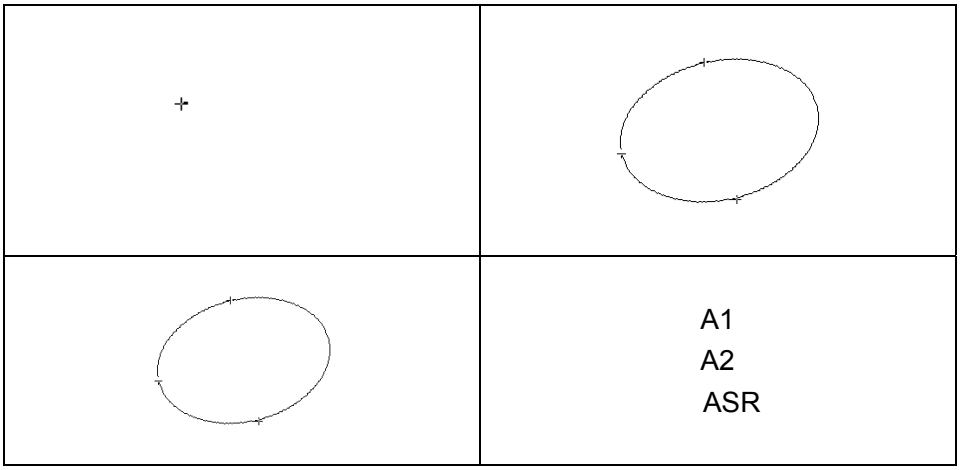


Figure 6-11 Area Stenosis Measurement and the Results

Angle

To determine an angle, draw two lines: A and B. The system calculates the angle.

To measure angle:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **Angle**, and then press **Set** to activate a measurement cursor on the screen.
3. Draw the first line A in the method of generic B-mode distance measurement.
4. Draw the second line B, move the cursor and press **Set** to anchor start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** to change the start point and the end point; if you press **Change** again, the system interchanges

line A and line B.

6. Roll the trackball and press **Set** to complete this measurement.
7. Roll the trackball and press **Set** again to begin a new angle measurement. You can measure a maximum of four groups of data. The angles formed by the two lines are displayed in Measured Results, in units of degrees. The outcome is displayed in Measured Results.
8. Press **Measure** to finish and exit.

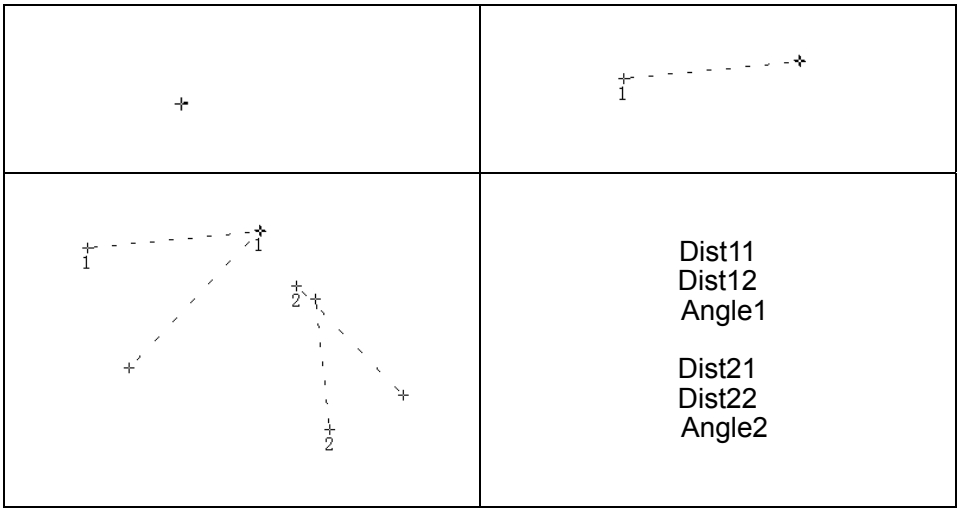


Figure 6-12 Angle measurement

Histogram

Freeze the image first before histogram measurement, otherwise the prompt “Image is not frozen, please freeze and retry!” will pop up.

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **Histogram**, and then press **Set** to activate a measurement cursor on the screen.
3. Roll the trackball, press **Set** to anchor the start point.
4. Roll the trackball, adjust the position and size of the histogram, and then press **Set** to anchor the end point.
5. During measurement, you can press **Change** to change the start point and the end point.
6. Roll the trackball and press **Set** again to begin a new histogram measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results.
7. Press **Measure** to finish and exit.

Others

Roll the trackball to highlight **Others** to select the desired measurements and calculations.

6.6.2. Generic Measurements in Mode

M-mode measurement and calculation include distance, time, slope and heart rate (2 cycles). These are for B/M and M Display Mode Only. The default measurement of B/M and M-mode is heart rate measurement. M-mode measurement menus are as shown below:

Figure 6-13 M Mode Generic Measurement and Calculation Menu

Distance To measure distance:

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Distance** and press **Set**.
3. Roll the trackball and press **Set** to anchor the start point and a big "+" is displayed.
4. Roll the trackball and press **Set** to anchor the end point.
5. Roll the trackball and press **Set** to begin a new distance measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results, as shown below.
6. Press **Measure** to finish and exit.

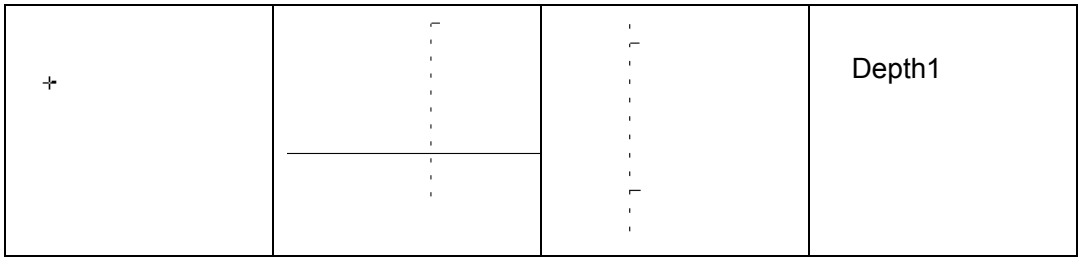


Figure 6-14 Distance Measurement and the Results

Time To measure time:

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Time** and press **Set**.
3. Roll the trackball to move the first measurement cursor at the beginning of the

time interval and then press **Set**, and the measurement mark turns to a vertical line.

4. Roll the trackball to move the first measurement cursor at the end of the time interval and then press **Set**.
5. Roll the trackball and press **Set** to begin a new time measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results, as shown below.
6. Press **Measure** to finish and exit.

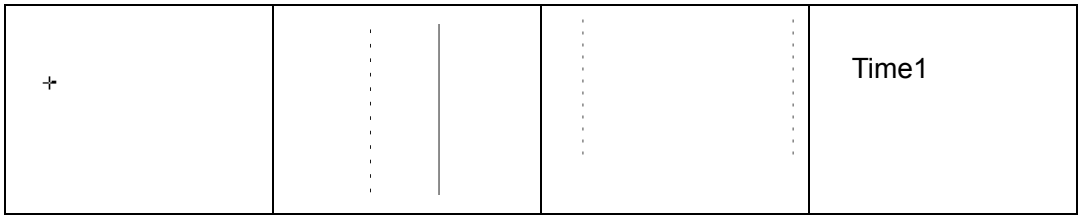


Figure 6-15 Time Measurement

Slope To measure slope:

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Slope** and press **Set** and a big "+" is displayed.
3. Roll the trackball and press **Set** to anchor the start point, and displays a big "+".
4. Roll the trackball and press **Set** to anchor the end point.
5. Roll the trackball and press **Set** to begin a new slope measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results, as shown below.
6. Press **Measure** to finish and exit.

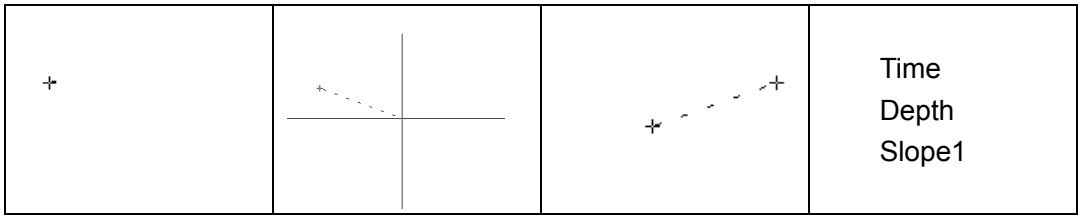


Figure 6-16 Slope Measurement and the Results

Heart Rate To measure heart rate:

1. In the **B/M-mode**, roll the trackball to change the position of the M Mark and press **Set** to obtain a satisfying electrocardiogram, and then freeze it.
2. In the **M-mode**, freeze the desired image.

Measure the distance between two peaks of cardiac cycles in the method of generic M-mode time measurement.

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Heart Rate** and press **Set** and a "+" is displayed.
3. Roll the trackball to move the first measurement maker on the first peak systole and then press **Set** to anchor start position, and the measurement mark turns to a vertical line.
4. Roll the trackball to move the second measurement maker on the peak systole following two complete cycles and then press **Set** to anchor end position.
5. Roll the trackball and press **Set** to begin a new heart rate measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results.
6. Press **Measure** to finish and exit.

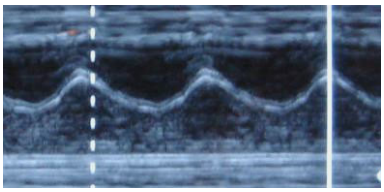


Figure 6-17 Heart Rate Measurement

NOTE:

In **B/M-mode**, you should define the M Mark position, and then begin the measurement.

6.6.3. General Report

To print the general ultrasound report:

Highlight **Print Report** in the B Mode Generic Measurement and Calculation Menu or the M Mode Generic Measurement and Calculation Menu, and press **Set** to display the **general worksheet** dialog box, as shown below:

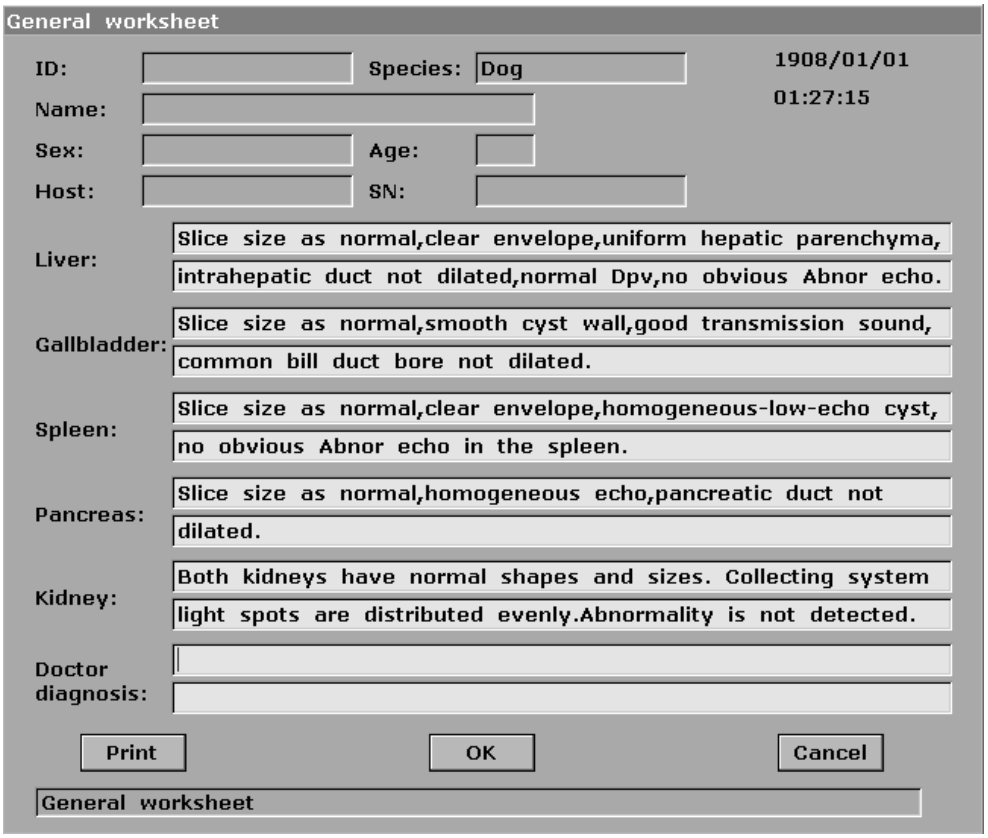


Figure 6- 18 General Worksheet Dialog Box

To print the report:

Press **Print** in the General Worksheet.

Printing reference section *5.8, Printing*.

6.7. CINE Review

Activate the device and enter the real-time B, B/B, 4B, or B/M scanning mode. Enable the system to collect images before CINE Review playback. Press **Freeze** to start frame-by-frame playback automatically. The cine function includes frame-by-frame playback and motion playback. Press **Cine** to switch between these two modes. The cine review symbol is displayed on the bottom of the screen, as shown below:

Figure 6-19 CINE Review Symbol

To perform the CINE Review playback:

1. Press **Freeze** to freeze the image, and the system displays the cine menu, as shown below:

Figure 6-20 Cine Review Menu

2. Roll the trackball to start playing back frame by frame. Roll the trackball to the right to advance the cine data one frame at a time, or to the left to move the data in reverse. The arrow on the CINE Review Symbol indicates the direction toward which the data is moving. The loop of data wraps around when either end is reached. As the trackball is moved, the current cine number is displayed on the right of the CINE Review Symbol.
3. Press **Cine** to stop playing back, and then roll the trackball to highlight **Play/Stop** and press **Set** to enter the motion playback mode.
4. During playing back, press **Play/Stop** to play or to stop.
5. During playing back, press **Save As** to save the file in BMP, JPG, RFM, DCM, CIN or AVI format. You can save files to the local disk or U disk. For details about operation method, please refer to 6.8.1 “Saving Files”.
6. Press **Cine** to go back to the frame-by-frame mode.
7. Press **Freeze** to exit the CINE Review playback.

The default setting is to load images by serial numbers forward.

NOTES:

1. Cine review is unavailable in B-mode.
2. The FPS (frames per second) is adjustable, from 5 to 50, in increments of 5.
3. After opening a cine file, you can do some measurements, add comments and a body mark on the image and print it in the report. See section *5.4.5 Comment function* and section *5.4.6. Body mark function* for detailed operation information.

6.8. File Management

Press **File** to display the file menu, as shown below:

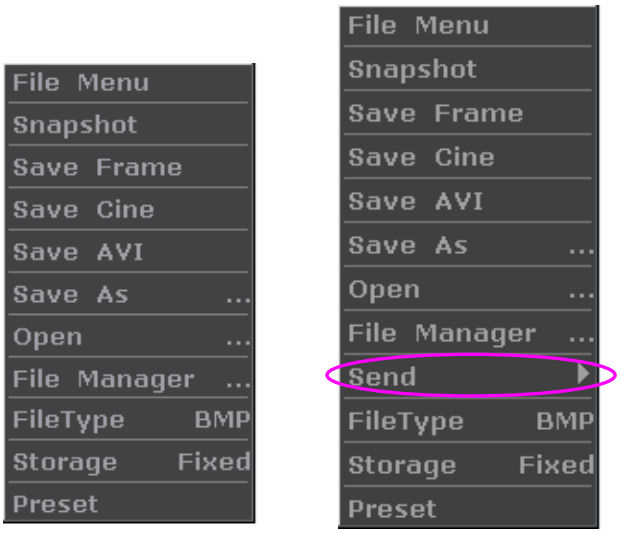


Figure 6-21 File Menu (the left—with no DICOM installed, the right—with DICOM installed)

6.8.1. Saving Files

File types:

The file types include BMP, JPG, DCM (if DICOM is installed), CIN, FRM, and AVI.

To choose a storage disk:

The storage disk can be set to **Fixed** or **USB-Disk** by the **Storage** option in the file menu.

To choose a storage disk: highlight **Storage** in the file menu and press **Set** repeatedly to cycle between **Fixed** and **USB-Disk**.

NOTE:

After connecting the removable disk, the system displays a USB symbol on the bottom right corner.

To set a file type:

The **File Type** in the file menu means the file type for the snapshot images.

To choose a file type for the snapshot images: highlight **File Type** in the file menu and press **Set** repeatedly to cycle between **JPG**, **BMP**, **FRM and DCM** (if DICOM is installed).

To save a file:

The system provides two ways to save images:

- Press **Snapshot** on the keyboard;

  Press **Snapshot** on the keyboard to save the current displaying image in BMP, JPG, FRM or

DCM (if DICOM is installed) formats, (set by **File Type** in the file menu, as shown above).

◆ Use **Snapshot**, **Save Cine**, **Save As**, **Save Frame** or **Save AVI** of the file menu to save files.

➢ **Snapshot**

Highlight **Snapshot** in the file menu and press **Set** to save the current displaying image in .BMP, FRM or JPG (set by **File Type** in the file menu, as shown above).

➢ **Save Frame**

1. Press **Freeze** to freeze the system;
2. Press **File** to open the file menu;
3. Highlight **Save Frame** in the file menu, and press **Set** to save the current displaying image.

➢ **Save Cine**

1. Press **Freeze** to freeze the system;
2. Press **File** to open the file menu;
3. Highlight **Save Cine** in the file menu, and press **Set**.

➢ **Save AVI**

1. Press **Freeze** to freeze the system;
2. Press **File** to open the file menu;
3. Highlight **Save AVI** in the file menu, and press **Set**.

NOTE:

The AVI files can not be viewed on this system, please use a U disk to copy the AVI files to a PC, and view them by using the WINDOWS RealPlayer.

➢ **Save As**

When obtaining a satisfying image:

1. Press **File** and select **Save As…**in the file menu to display the **File Save As** dialog box.
2. Choose the driver and the file type.
3. Press **Set** on the pane next to File Name, and use the keyboard to enter a file name with a maximum of ten characters.

4. Press **OK** to save.

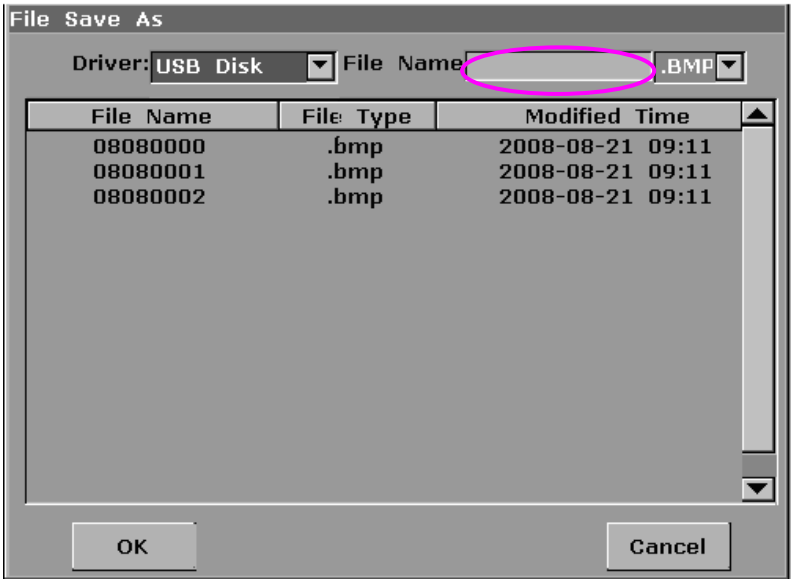


Figure 6- 22 File Saving Dialog Box

When saving a file, the saving information is automatically displayed in the middle of image area.

These files are automatically numbered in sequence. For instance, if the latest number comes to YYMM0020, and if you save a file the next time, the file is numbered YYMM0021.

6.8.2. Opening Files

Press **File** in the real-time/freezing mode, and the system displays the file menu. Then select **Open** and press **Set** to display an **Open File** dialog box, as shown below.

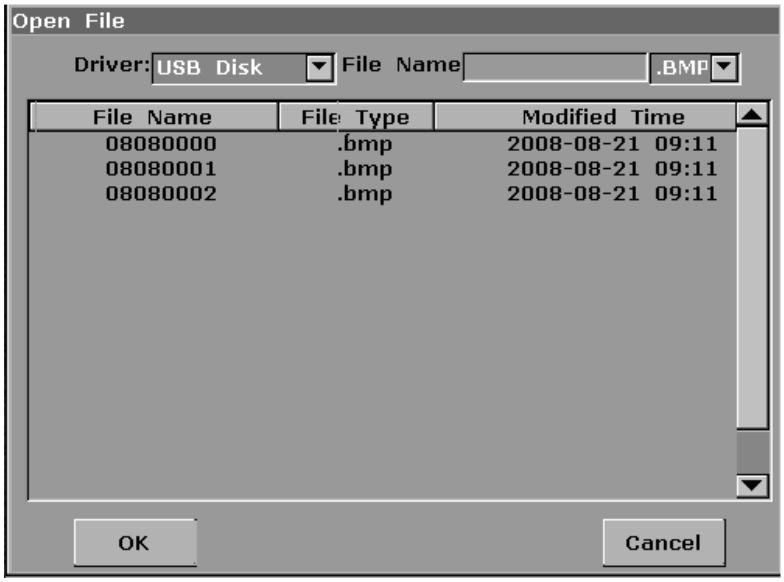


Figure 6-23 File Opening Dialog Box

The default driver is the local disk, and the default file type is **.BMP**. The file types include BMP,

JPG, FRM, CIN, and DCM. Pressing the symbol "▼" to display the driver or the file type, and then roll the trackball to choose the type.

Enter a file name, or select a desired file name and press **Open**; or double-click on a file name, the system begins to load the corresponding image. A prompt instruction ***Loading file…*** is displayed in the middle of the screen. Then the prompt instruction disappears and the system displays the designated image.

NOTES:

1. Images that have not yet been saved in the saving zone can not be loaded.
2. When saving or loading image is still in process (prompt instruction Saving file… or Loading file…), please do NOT perform any other operation. This is to avoid damaging the device.
3. You should freeze the system before opening Cine Images and FRM files.
4. After opening a FRM file, you can do some measurements, add comments and a body mark on the image and print it in the report. See section *5.4.5 Comment function* and section *5.4.6. Body mark function* for detailed operation information.

6.8.3. Browsing Images

After opening an image, press << to open the previous image, and press >> to open the next image; Press **Play** to start playing all the images automatically and the **Play** key changes into the **Stop** key; Press **Stop** to stop playing images; press Exit to exit the browsing.

Figure 6-24 Image Browsing Dialog Box

NOTE:

The JPG, BMP, and DCM (if DICOM is installed) images are available to the browsing function.

6.8.4. File Manager

The file manager dialog box is as shown below.

Figure 6-25 File Manager Dialog Box

You can use the file manager to do the file management. After opening an image, you can do the image viewing as shown in section *6.8.3 Browsing Images*.

NOTES:

1. When you are copying & pasting a file, cutting & pasting a file, importing a file or exporting a file, do NOT pull in or pull out the U disk.
2. USB disk must be in FAT32 format.
3. Do NOT use the u-disk for other use, but only for this device. Otherwise the storage and the transmission function may not be stable.
4. We suggest that you use the Netac U disk: Netac U180 (2G). DUS 3 VET also supports U disk that is larger than 2G.

To copy & paste a file:

1. Roll the trackball to select the source driver and the type of file, and then press **Set**.
2. Roll the trackball to highlight the source file, and press **Set**, and then press **Copy**.
3. Roll the trackball to select the destination driver and press **Set**.

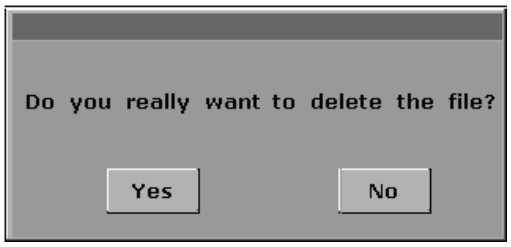
4. Press **Paste**.

To cut & paste a file:

1. Roll the trackball to select the driver and the type of file, and then press **Set**.
2. Roll the trackball to highlight the file that will be cut, and press **Set**, and then press **Cut**.
3. Roll the trackball to select the destination driver and press **Set**.
4. Press **Paste**.

To delete a file:

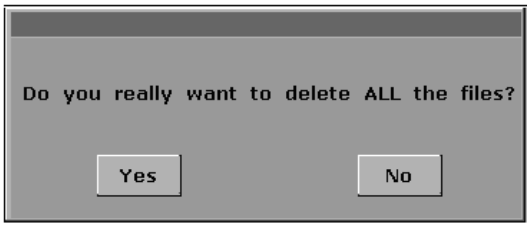
1. Roll the trackball to select the driver and the type of file, and then press **Set**
2. Roll the trackball and then press **Set** to select the file you want to delete.
3. Press **Delete**, a prompt instruction is displayed in the middle of the screen, as shown below:



4. Press **Yes** to delete the designated file, or press **No** to give up the deleting operation.

To delete all:

1. Roll the trackball to select the driver and the type of file, and then press **Set**.
2. Press **Del All**, a prompt instruction is displayed in the middle of the screen, as shown below:



3. Press **Yes** to delete the all the files, or press **No** to give up the deleting operation.

To rename a file:

1. Roll the trackball to select the driver and the type of file, and then press **Set**.
2. Roll the trackball and press **Set** to select the file you want to rename,.
3. Press **Rename** to open the dialog box, as shown below, and enter the new name of the file using the keyboard, with a maximum of eight characters.

4. Press **OK** to rename the designated file, or press **Cancel** to give up the renaming operation.

To import from U-disk:

You can use the **Import From U-Disk** button to import all the files from U-disk to the local disk.

To export to U-disk:

You can use the **Export To U-Disk** button to export all the files from local disk to U-disk.

6.8.5. Sending Files

If you have installed the DICOM software, and the DICOM presetting has been performed correctly, you can send images / files.

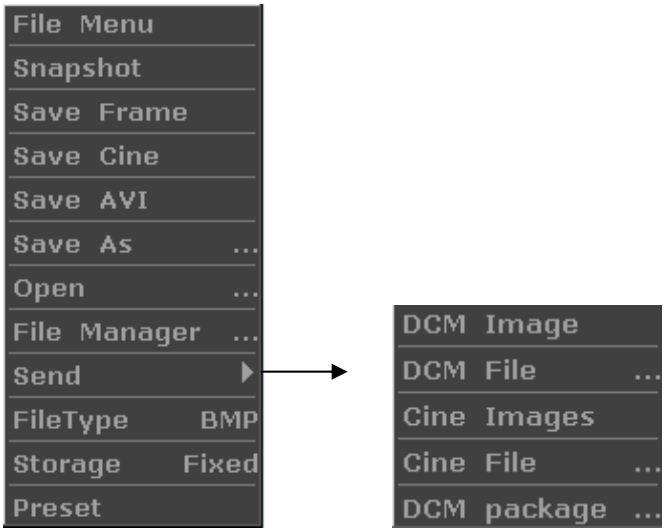


Figure 6-26 File Menu (with DICOM Function)

To send a DCM Image

1. Highlight the secondary menu **DCM Image**, and then press **Set**.

2. If the server is running normally, the current image will be sent to the server.

3. The system displays a prompt indicating the successful transmission.

To send a DCM file

1. Highlight the secondary menu **DCM File**, and then press **Set**.

2. The system displays the File Opening Dialog Box for selecting a DCM file to be transmitted.

3. If the server is running normally, the selected file will be sent to the server.

4. The system displays a prompt indicating the successful transmission.

To send Cine Images

1. Freeze the system.

2. Press **File** to enter the file menu.

3. Highlight the secondary menu **Cine Images**, and then press **Set**.

4. If the server is running normally, the current Cine images will be sent to the server.

5. The progress bar disappears after successful transmission.

To send a Cine File

1. Highlight the secondary menu **Cine File**, and then press **Set**.

2. The system displays the File Opening Dialog Box for selecting a cine file to be transmitted.

3. If the server is running normally, the selected file will be sent to the server.

4. The progress bar disappears after successful transmission.

To send DCM package

1. Highlight the secondary menu DCM package, and then press **Set**.

2. The system displays the File Opening Dialog Box, press **OK** to send all the saved DCM files to the server.

3. The system displays a prompt indicating the successful transmission.

6.9. Puncture Function

NOTE:

Use proper disinfection technique at all times to perform a biopsy.

Always follow these basic precautions:

WARNING

1. Disinfect the needle guide before the first use and after each subsequent use.
2. Always handle transducers and needle guide adaptors with care. Do NOT use a transducer or an adaptor if it has been dropped or struck against a hard surface until it is inspected by a customer engineer of the manufacturer.
3. The displayed needle guide pathway on the manufacturer video monitor is intended for reference during biopsy procedures. A variety of factors outside the

manufacturer's control, such as changing tissue density, bending of the needle, off-axis pressure by the person holding the transducer, may cause deflection of a needle outside of the displayed video pathway even when the transducer, needle guide, and the system software are all performing as intended and within manufacturing specification. The specialist performing a biopsy procedure must be aware of potential external factors when executing an invasive procedure.

4. The caliper must be placed along the needle path. If not, the displayed measurements may be incorrect.
5. The manufacturer needle guides are designed and manufactured to attach firmly to designated transducers and should not require excessive force to assemble or disassemble. If it appears that excessive force or manipulation is required to assemble or disassemble needle guide components, please contact your customer engineer of the manufacturer before using it.

To enable the puncture function:

In real-time B mode imaging, highlight **Needle Guide** and then press **Set**. Prompt information ***Needle guide line must be calibrated prior to each puncture*** is displayed on the screen. Press **Close** and enter the puncture function and a needle guide menu is displayed, as shown below.

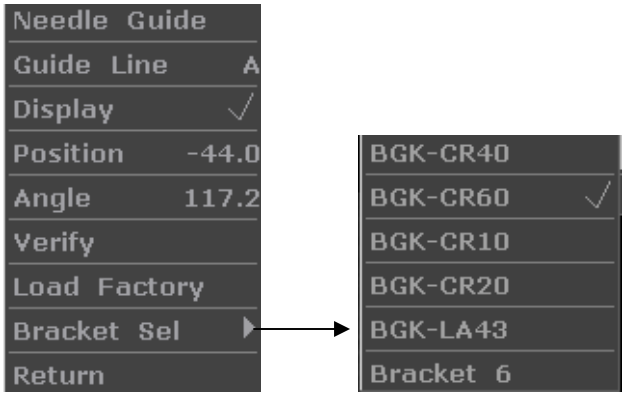


Figure 6-27 Needle Guide Menu

To exit puncture function:

Press **Return** of the needle guide menu to exit puncture function, the needle guide menu is closed and the needle guide line in image disappears.

WARNING

Do NOT freeze the system when doing puncture.

NOTES:

1. There are no more than 3 needle guide lines for each puncture frame.
2. If image depth ≤ 8 cm, the distance between the two nods of the needle guide line indicates 0.5 cm.

3. If image depth > 8 cm, the distance between the two nods of the needle guide line indicates 1 cm.

6.9.1. To Select the Angle of Needle Guide Line

If the puncture frame has several kind of angle, you can highlight **Guideline** in the needle guide menu and press **Set** to make a choice, and the system displays the angle.

6.9.2. To Display or To Hide the Needle Guide Line

Highlight **Display** in the needle guide menu, and press **Set** repeatedly to display or to hide the needle guide line.

6.9.3. To Adjust the Needle Guide Line

Needle guide line has been verified when the device is produced. The value is saved in Factory data. But after a period of use, the needle guide line needs to be adjusted since the real value may be changed.

WARNING

1. Prior to each puncture, calibrate the needle guide line.
2. If the needle position is not the same as the needle guide line position, do NOT do the puncture.

To calibrate the guide line (performing phantom cal):

1. Put the assembled puncture kit, put the probe in to water phantom, and perform the water scan;
2. Adjust the position and angle of needle to comply with the guide line as shown below;
3. Select **Verify** to save the verified value.

◆ To verify the needle guide line:

Move the needle guide line horizontally

Highlight **Position**, press **Set** to increase the value and press **Back** to decrease the value, and the value is displayed in the menu option.

◆ To adjust the angel of needle guide line:

Enter **Angle** option to adjust the angle. Operation procedure is the same as the **Position**.

◆ To save the verified value:

After verifying the position and the angle, highlight **Verify** and press **Set**, and the system saves the verified value. After restarting the system, the verified value is activated.

- To save the factory data:

  Highlight **Load Factory** and press **Set** to load the factory data.

- To select the bracket:

  If the probe has different brackets, you can use the **Bracket sel** option to select the bracket.

6.9.4. Reference Line

In the single B mode, press **SHIFT+CAPS** to display or to hide the reference line. When the reference line is displayed, roll the trackball to adjust its position, and press **Set** to set its position.

NOTE: The reference line is not displayed after 90° rotation or magnification.

6.10. Breakstone Guide

Highlight **Breakstone** in the B mode menu, and press **Set** to display the breakstone guide line in the middle of the screen.

NOTE: The breakstone guide is not displayed after 90° rotation or magnification.

Chapter 7 Obstetrics Measurement and Calculation

The obstetric examination is usually in the B-mode.

Enter B-mode obstetric examination:

1. Press the **Exam** key.
2. Select **Obstetric** in the Exam Type menu, and then press **Set**.
3. Press to enter the B-mode.
4. Press **Measure** to activate the measurement function. The measurement menu is displayed.

7.1. Obstetrics Measurement and Calculation

Items of Measurement and Calculation

CRL, GSD, GSD-H, GSD-V, HD, TD, BD, BPD, and MA.

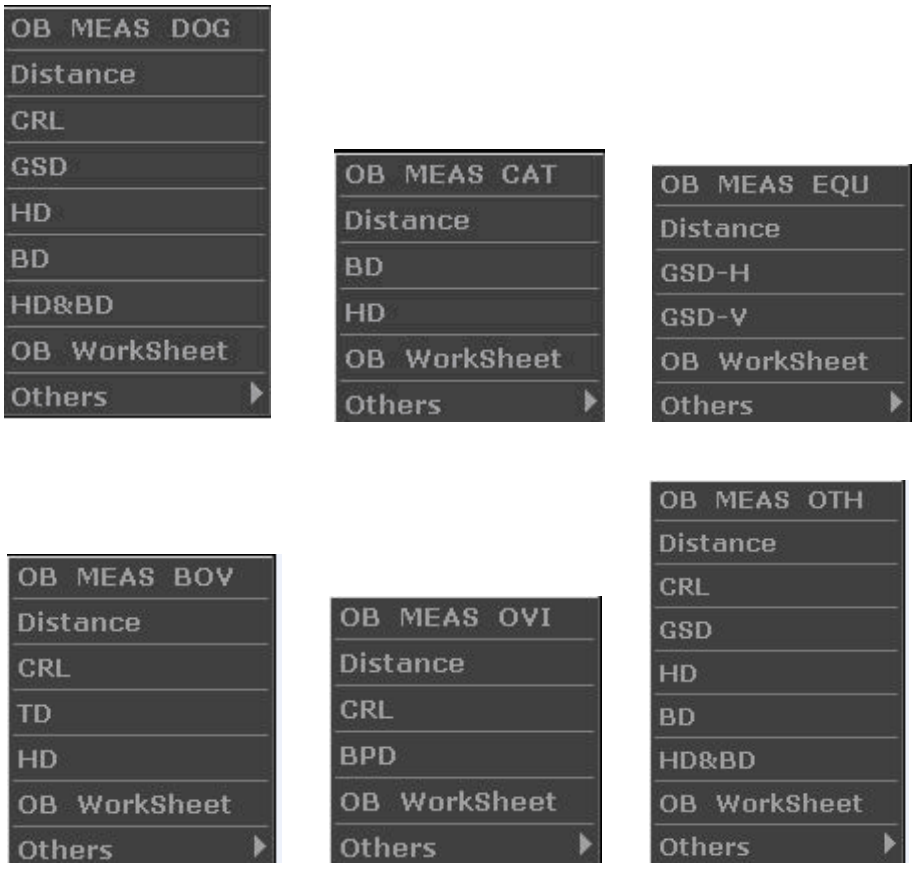


Figure 7-1 Obstetrics Measurement and Calculation Menu

Label	Description	Channel	Method	Results display
CRL	Crown Rump Length	1	Distance (mm)	AVE MA will be displayed, and only the measured parameter value in the valid range of the preset formula will be calculated for the AVE value.
GSD	Gestational Sac Diameter	1		
GSD-H	Gestational Sac Diameter-Horizontal	1		
GSD-V	Gestational Sac Diameter-Vertical	1		
HD	Head Diameter	1		
TD	Trunk Diameter	1		
BD	Body Diameter	1		
BPD	Biparietal Diameter	1		
MA	Menstrual Age	1	According to species, described in Appendix C.	

Table 7-1 Obstetrics Measurement & Calculation

7.2. Dog Obstetrics Measurement

When the species is set to Dog, the OB MEAS DOG menu will display after entering the obstetrics measurement.

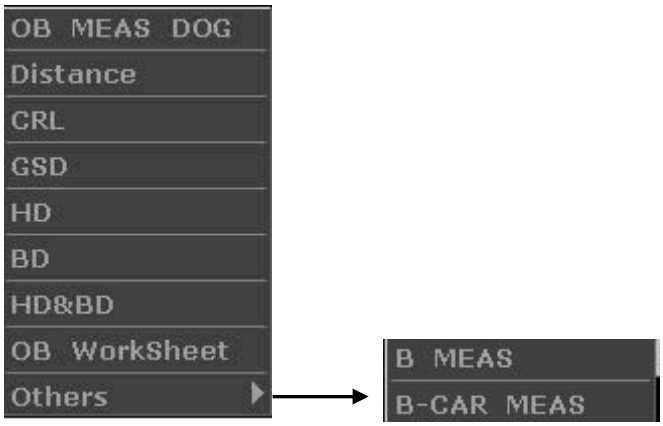


Figure 7-2 Dog Obstetrics Measurement and Calculation Menu

After measuring one or more measurement items of GSD, CRL, HD, BD, HD&BD, the system will calculate the MA automatically and display the result.

7.2.1. CRL

To measure CRL:

1. Press the **Measure** key to activate obstetric measurement.
2. In the obstetric menu, roll the trackball to highlight the menu **CRL**, press the **Set** key, and move the cursor to image and display "+".

3. Measure CRL, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*

4. The result is displayed in Measured Results.

5. To begin a new CRL measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.2.2. GSD

To measure GSD:

1. Press the **Measure** key to activate obstetric measurement.

2. In the obstetric menu, roll the trackball to highlight the menu **GSD**, press the **Set** key, and move the cursor to image and display "+".

3. Measure GSD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*

4. The result is displayed in Measured Results.

5. To begin a new GSD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.2.3. HD

To measure HD:

1. Press the **Measure** key to activate obstetric measurement.

2. In the obstetric menu, roll the trackball to highlight the menu **HD**, press the **Set** key, and move the cursor to image and display "+".

3. Measure HD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*

4. The result is displayed in Measured Results.

5. To begin a new HD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.2.4. BD

To measure BD:

1. Press the **Measure** key to activate obstetric measurement.
2. In the obstetric menu, roll the trackball to highlight the menu **BD**, press the **Set** key, and move the cursor to image and display "+".
3. Measure BD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*
4. The result is displayed in Measured Results.
5. To begin a new BD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.2.5. HD&BD

To measure HD&BD:

1. Press the **Measure** key to activate obstetric measurement.
2. In the obstetric menu, roll the trackball to highlight the menu **HD&BD**, press the **Set** key, and move the cursor to image and display "+".
3. Measure HD&BD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*
4. The result is displayed in Measured Results.
5. To begin a new HD&BD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.3. Cat Obstetrics Measurement

When the species is set to Cat, the OB MEAS CAT menu will display after entering the obstetrics measurement.

Figure 7-3 Cat Obstetrics Measurement and Calculation Menu

After measuring one or both of the two measurement items, HD, BD, the system will calculate the MA automatically and display the result.

The measurements of HD and BD are the same to that of the dog, please refer to section *7.2.3 HD* and *7.2.4 BD* respectively for reference.

7.4. Equine Obstetrics Measurement

When the species is set to Equine, the OB MEAS EQU menu will display after entering the obstetrics measurement.

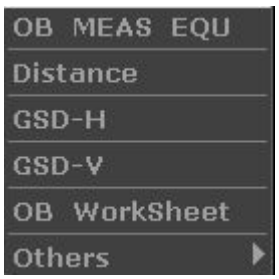


Figure 7-4 Equine Obstetrics Measurement and Calculation Menu

After measuring one or both of the two measurement items, GSD-H, GSD-V, the system will calculate the MA automatically and display the result.

7.4.1. GSD-H

To measure GSD-H:

1. Press the **Measure** key to activate obstetric measurement.
2. In the obstetric menu, roll the trackball to highlight the menu **GSD-H**, press the **Set** key, and move the cursor to image and display "+".
3. Measure GSD-H, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*
4. The result is displayed in Measured Results.
5. To begin a new GSD-H measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.4.2. GSD-V

To measure GSD-V:

1. Press the **Measure** key to activate obstetric measurement.
2. In the obstetric menu, roll the trackball to highlight the menu **GSD-V**, press the **Set** key, and

move the cursor to image and display "+".

3. Measure GSD-V, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*

4. The result is displayed in Measured Results.

5. To begin a new GSD-V measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.5. Bovine Obstetrics Measurement

When the species is set to Bovine, the OB MEAS BOV menu will display after entering the obstetrics measurement.

Figure 7-5 Bovine Obstetrics Measurement and Calculation Menu

After measuring one or more measurement items of CRL, TD, HD, the system will calculate the MA automatically and display the result.

The measurements of CRL and HD are the same to that of the dog, please refer to section *7.2.1 CRL* and *7.2.3 HD* respectively for reference.

7.5.1. TD

To measure TD:

1. Press the **Measure** key to activate obstetric measurement.

2. In the obstetric menu, roll the trackball to highlight the menu **TD**, press the **Set** key, and move the cursor to image and display "+".

3. Measure TD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*

4. The result is displayed in Measured Results.

5. To begin a new TD measurement, repeat steps 1 through 3. You can measure a maximum of

one group of data.

7.6. Ovine Obstetrics Measurement

When the species is set to Ovine, the OB MEAS OVI menu will display after entering the obstetrics measurement.

Figure 7-6 Ovine Obstetrics Measurement and Calculation Menu

After measuring one or both of the two measurement items, CRL, BPD, the system will calculate the MA automatically and display the result.

The measurement of CRL is the same to that of the dog, please refer to section *7.2.1 CRL* for reference.

7.6.1. BPD

To measure BPD:

1. Press the **Measure** key to activate obstetric measurement.
2. In the obstetric menu, roll the trackball to highlight the menu **BPD**, press the **Set** key, and move the cursor to image and display "+".
3. Measure BPD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurements in B Mode.*
4. The result is displayed in Measured Results.
5. To begin a new BPD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

7.7. Other Obstetrics Measurements

When the species is set to **Others**, the OB MEAS OTH menu will display after entering the obstetrics measurement.

Figure 7-7 Other Obstetrics Measurements and Calculation Menu

The measurements items of **OB MEAS OTH** are the same as those of **OB MEAS DOG.** Please refer to section *7.2 Dog Obstetrics Measurement* for the measurements and calculations.

7.8. Obstetric Report

After obstetric examination, the system generates an obstetrical diagnosis worksheet automatically, and the worksheet includes the information of the animal, the measurements and calculations, and the diagnosis.

Select **OB Worksheet** and press **Set** to open dialog box **Obstetric Worksheet**, as shown below:

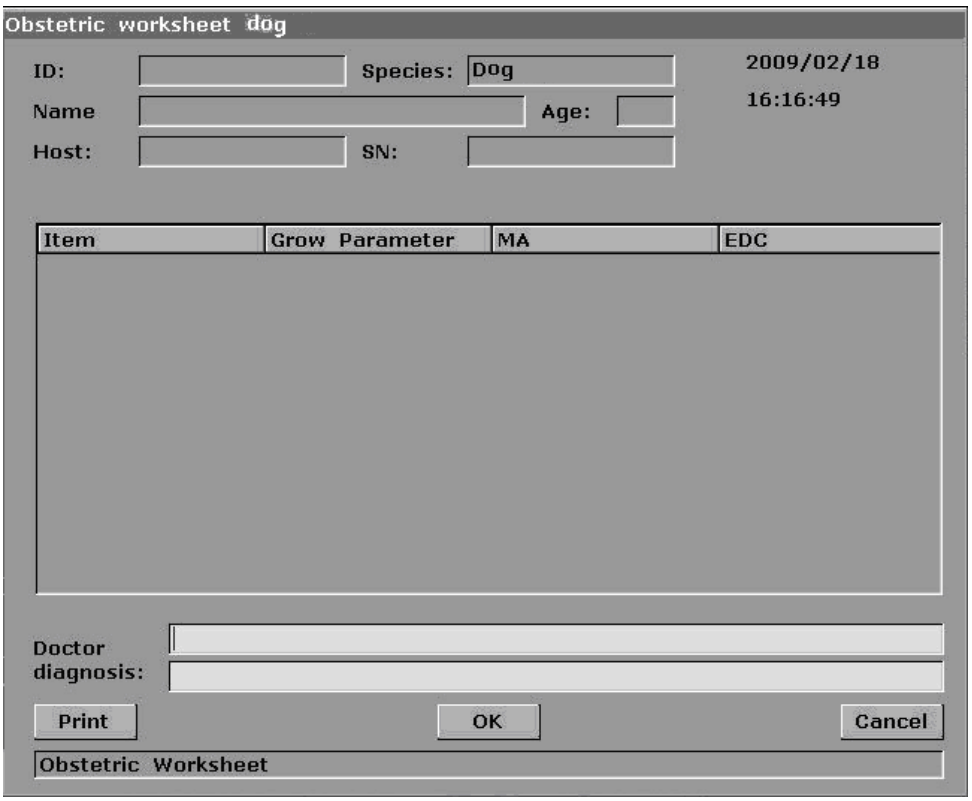


Figure 7-8 Dog Obstetrics Worksheet

The diagnosis editing column displays the cursor "I", and you can enter diagnosis information.

NOTES:

1. The system displays the completed measurements and calculations. The uncompleted measurements and calculations are not displayed.
2. You can check the measured items by opening the obstetric worksheet dialog box whenever you want, during measurement or after that. Then press **OK** or **Cancel** to close the dialog box, and continue to measure.

To print the report:

Press **Print** in the Obstetric Worksheet.

Printing reference Section *5.8, Printing.*

Chapter 8 Cardiology Measurement and Calculation

The cardiology examination is usually in the B-mode, the B/M-mode or the M-mode.

To enter cardiac exam mode,

1. Press the **Exam** key.

2. Select **Cardiology** in the Exam Type menu, and then press **Set**.

8.1. Cardiac Measurement and Calculation in M Mode

Press to enter the M-mode, or press to enter the B/M mode, and then press **Measure** to activate the measurement function. The measurement menu is displayed.

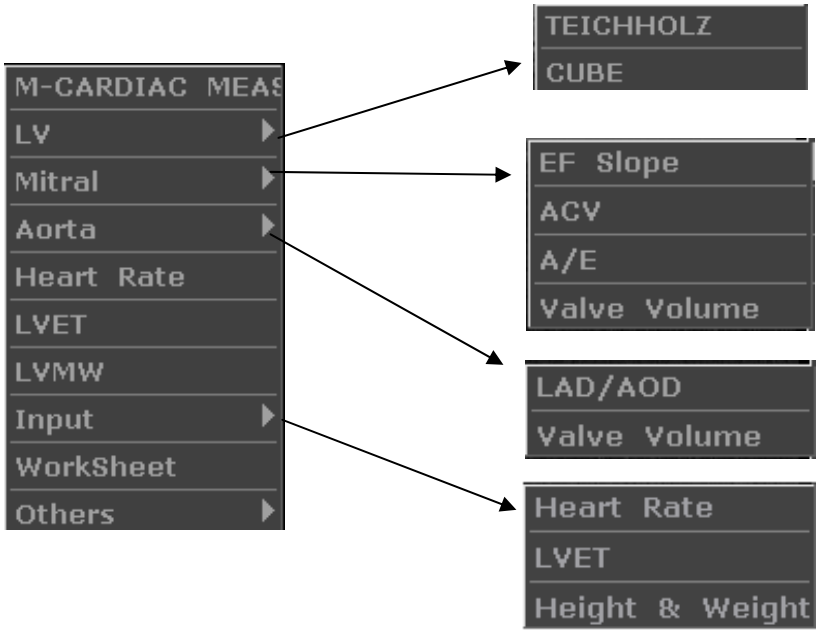


Figure 8-1 M Mode Cardiac Measurement and Calculation Menu

1. Items of Measurement and Calculation

M-CARDIAC MEAS: LV, Mitral, Heart Rate, LVET, and LVMW.

2. Items of input

Heart Rate, LVET, and Height &Weight.

The formulas of B/M-mode and M-mode cardiac LV measurement include TEICHHOLZ and CUBE, as shown below, and the default formula is TEICHHOLZ.

1. CUBE formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVIDd	Left Ventricle Internal Diameter	Distance (mm)
LVIDs	Left Ventricle Internal Diameter	
ET	Ejection Time	Time (ms or s)
HR	Heart Rate	M-mode heart rate measurement or key in (bpm)
EDV	End Diastolic Volume	EDV (mL) = $LVIDd^3$ (mm^3)/1000
ESV	End Systolic Volume	ESV (mL) = $LVIDs^3$ (mm^3)/1000
SV	Stroke volume	SV (mL) = EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min) = SV (mL) x HR (bpm)/1000
EF	Ejection fraction (M-mode)	EF (No unit) = SV (mL)/ EDV (mL) x 100%
FS	Fractional Shortening	FS (No unit) = [{ LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm)]x 100%
SI	Stroke Index	SI (No unit) = SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit) = CO (L/min)/ BSA (m^2)
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit) = { LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) x ET (ms)/1000}
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 8-1 Measurement and Calculation Items with CUBE formula

The formulas of BSA calculation:

Dog: $BSA=0.112*WT^{0.67}$;
Cat: $BSA=0.098*WT^{0.67}$;
Equine: BSA=1.09+0.008*WT;
Bovine: $BSA=0.14*WT^{0.57}$;
Ovine: $BSA=0.085*WT^{0.67}$;
Others: $BSA=0.112*WT^{0.67}$;

HT: height, cm;
WT: weight, kg;
BSA: Body Surface Area m^2.

2. TEICHHOLZ formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVIDd	Left Ventricle Internal Diameter	Distance (mm)
LVIDs	Left Ventricle Internal Diameter	
ET	Ejection Time	Time (ms or s)
HR	Heart Rate	M-mode heart rate measurement or key in (bpm)
EDV	End Diastolic Volume	EDV (mL) = {7 × LVIDd ^{3} (cm)^3}/{2.4+ LVIDd (cm)}
ESV	End Systolic Volume	ESV (mL) = {7 × LVIDs ^{3} (cm)^3}/{2.4+ LVIDs (cm)}
SV	Stroke volume	SV (mL) = EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min) = SV (mL) × HR (bpm)/1000
EF	Ejection fraction (M-mode)	EF (No unit) = SV (mL)/ EDV (mL) ×100%
FS	Fractional Shortening	FS (No unit) = [{ LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm)] ×100%
SI	Stroke Index	SI (No unit) = SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit) = CO (L/min)/ BSA (m^2)
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit) = {LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) x ET (ms)/1000}
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 8-2 Measurement and Calculation Items with TEICHHOLZ formula

3. Other measurement items:

Label	Description	Method
AOD	Aortic root Diameter	Distance (mm)
LAD	Left Atrium Diameter	
CA	Cardiac cycle apex A	
CE	Cardiac cycle apex E	
EF SLP	Ejection Fraction Slope	Slope (mm/s)
ACV	AC Decreasing Velocity	
DEV	Deceleration Velocity	
DCT	Deceleration Time	Time (ms or s)
MAVO1	Aortic Valve Volume Opened, beginning	Distance (mm)
MAVO2	Aortic Valve Volume Opened, ending	
AA	Aortic Amplitude	
LVMW	Left Ventricular Muscle Weight	LVMW (g) =1.04* ({IVSTd (cm)+LVIDd (cm)+LVPWd (cm)}^{3}-LVIDd^3 (cm)^3)-13.6
LVMWI	Left Ventricular Muscle Weight Index	LVMWI (No unit) = LVMW/BSA
CA/CE	The ratio of CA to CE	CA/CE (No unit) = CA (mm)/CE (mm)
LAD/AOD	Left Atrium Diameter / Aortic root Diameter	LAD/AOD (No unit) = LAD (mm) / AOD (mm)
AVSV	Aortic Valve Stoma Valve flow	AVSV (mL) = MAVO1 (cm)+MAVO2 (cm)* ET (s)*50+AA (cm)
QMV	Mitral Valve Flow	QMV (mL) = 4*DEV (cm/s)*DCT (s)

Table 8-3 Other Measurement Items

4. Calculation items:

Label	Description	Method
EDV	End Diastolic Volume	EDV (mL) = $LVIDd^3$ (mm^3)/1000 CUBE formula
ESV	End Systolic Volume	ESV (mL) = $LVIDs^3$ (mm^3)/1000 CUBE formula
SV	Stroke volume	SV (mL) = EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min) = SV (mL) × HR (bpm)/1000
EF	Ejection fraction (M-mode)	EF (No unit) = SV (mL)/ EDV (mL) × 100%
FS	Fractional Shortening	FS (No unit) =[{LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm)]x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit)= { LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) × ET (ms)/1000}
BSA	Body Surface Area (m^2)	Calculate by to the selected formula
LVMW	Left Ventricular Muscle Weight	LVMW (g)=1.04*[{IVSTDd (cm)+LVIDd (cm) + $LVPWd^3$ (cm)}^{3}-$LVIDd^3$ $(cm)^3$]-13.6
LVMWI	Left Ventricular Muscle Weight Index	LVMWI (No unit)=LVMW/BSA
CA/CE	The ratio of CA to CE	CA/CE (No unit)= CA (mm)/CE (mm)
LAD/AOD	Left Atrium Diameter / Aortic root Diameter	LAD/AOD (No unit)= LAD (mm)/AOD (mm)
AVSV	Aortic Valve Stoma Valve flow	AVSV (mL)=MAVO1 (cm)+MAVO2 (cm)* ET (s)*50+AA (cm)
QMV	Mitral Valve Flow	QMV (mL)=4*DEV (cm/s)*DCT (s)

Table 8-4 Calculation Items

8.1.1. LV

The B/M-mode and M-mode measurements of LV are based on ESV and EDV, which are calculated by LVIDs and LVIDd measurements respectively.

After measuring LVIDs and LVIDd and entering Heart Rate, LVET, and Height & Weight, the system can calculate some physiological parameters, such as ESV, EDV, SV, EF, FS, CO, MVCF, SI, and CI.

There are two calculation formulas for heart antrum volume in the B/M-mode and the M-mode, as shown in table 8-5.

Item	Formula
TEICHHOLZ	EDV (mL)= 7 x $LVIDd^3$ (cm^3)/{2.4 + LVIDd (cm)} ESV (mL)= 7 x $LVIDs^3$ (cm^3)/{2.4 + LVIDs (cm)}
CUBE	EDV (mL) = $LVIDd^3$ ($mm)^3$ / 1000 ESV (mL) = $LVIDs^3$ ($mm)^3$ / 1000

Table 8-5 TEICHHOLZ and CUBE Formula

NOTE:

Ensure that the value of LVIDd is bigger than that of LVIDs, or the system can not display the calculation items.

SV and EF calculation is as below.

- Measurement items:

  LVIDs and LVIDd

- To measure LV:

1. In the M-cardiac measurement menu, roll the trackball to highlight **LV**, and the secondary menu is displayed. Select TEICHHOLZ or CUBE and press **Set**. Then move the cursor to the image area and a "+" is displayed.
2. Move the cursor to the end systolic of left ventricle, and measure LVIDs. The method is similar to generic M-mode distance measurement. LVIDs and ESV are displayed in Measured Results.
3. Move the cursor to the end diastolic of the left ventricle, and measure LVIDd. The method is similar to generic M-mode distance measurement. LVIDd, EDV, SV, EF, and FS are displayed in Measured Results.

◆ To calculate CO

After measuring LV, you can calculate CO by measuring HR or entering HR.

To measure HR:

1. In the M-cardiac measurement menu, roll the trackball to highlight **HR**, and press **Set**. Then move the cursor to the image area and a "+" is displayed.

2. Measure HR, in the method of HR.

For more information on M-mode Generic HR Measurements, please refer to section *6.6.2 M-mode Generic Measurements*.

3. After completing the HR measurement, the HR and CO are displayed in Measured Results.

To enter HR:

1. In the M-cardiac measurement menu, roll the trackball to highlight **Input**, select the secondary menu **Heart Rate** and press **Set** to display a HR entering dialog box, as shown below.

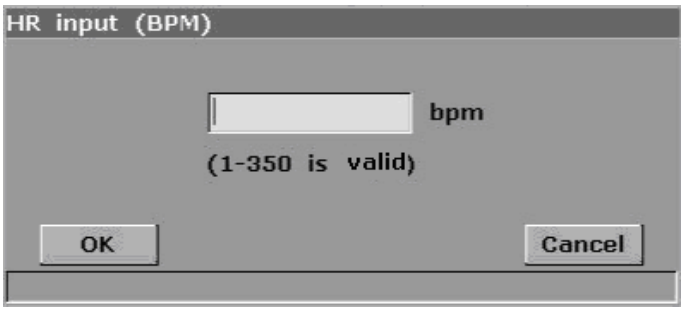


Figure 8-2 HR Inputting Dialog Box

2. Input a suitable value in the HR box .
3. Roll the trackball to highlight **OK** and press **Set**, and after measuring LV, the result of CO is displayed in Measured Results.

◆ To calculate MVCF

After measuring LV, you can calculate MVCF by measuring LVET or entering LVET.

To measure LVET:

4. In the M-cardiac measurement menu, roll the trackball to highlight **LVET**, and press **Set**. Then move the cursor to the image area and a "+" is displayed.
5. Measure LVET, in the method of TIME.

For more information on M-mode Generic Time Measurements, please refer to section *6.6.2 M-mode Generic Measurements*.

6. After completing the LVET measurement, the LVET and MVCF are displayed in Measured Results.

To enter LVET

2. In the M-cardiac measurement menu, roll the trackball to highlight **Input**, select the secondary menu **LVET** and press **Set** to display an LVET entering dialog box, as shown below.

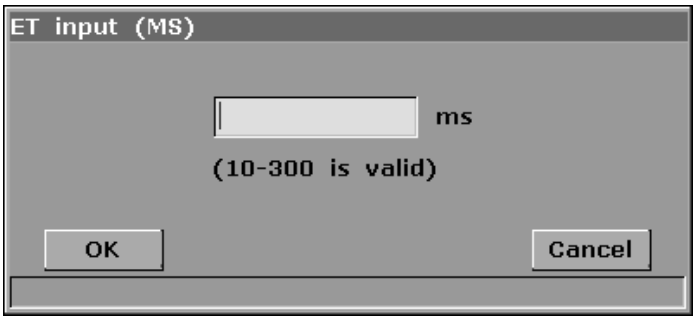


Figure 8-3 ET Inputting Dialog Box

3. Input a suitable value in the LVET box.
4. Roll the trackball to highlight **OK** and press **Set**.

◆ To calculate CI, SI

After measuring LV and HR, you can calculate MVCF by entering Height and Weight.

Enter Height and Weight

1. In the M-cardiac measurement menu, roll the trackball to highlight **Input**, select the secondary menu **Height & Weight** and press **Set** to display a Height and Weight entering dialog box, as shown below.

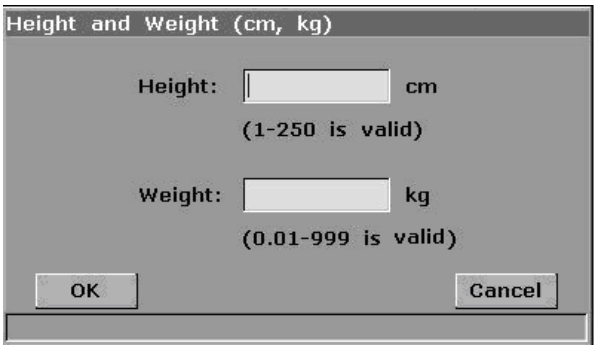


Figure 8-4 Height and Weight Inputting Dialog Box

2. Input suitable values in the Height and Weight boxes.
3. Roll the trackball to highlight **OK** and press **Set**.

The measurements and calculations of all the LV parameters are as below.

- Measurement or input items:

Input or measurement: HR, LVET and patient's Height & Weight;

Measurement: LVIDs and LVIDd

- To calculate all the LV parameters:

1. Input or measure HR, LVET, and Height & Weight.
2. Measure LVIDs and LVIDd following the prompt instruction.

3. All the LV parameters, ESV, EDV, SV, FS, EF, CO, MVCF, SI and CI are displayed in Measured Results.

8.1.2. Mitral Valve

Mitral Valve calculation is as below.

- Measurement items:

EF slope, ACV, CA/CE, DEV, and DCT

- Mitral Valve measurement:

In the M-cardiac measurement menu, roll the trackball to highlight **Mitral** to display the secondary menu.

✧ **To measure EF slope, ACV, and CA/CE**

1. Roll the trackball to highlight **EF Slope**, **ACV**, or **A/E**, and press **Set**.
2. The method of measuring **EF Slope** and **ACV** in the method of generic M-mode slope measurement.
3. To measure **A/E**, measure the breadth from apex A to point C and the breadth from apex E to point C respectively in the method of generic M-mode distance measurement.
4. After the measurement the result of EF SLP, ACV and CA/CE are displayed in Measured Results respectively.

✧ **To measure Valve Volume (QMV)**

Calculation formula:

QMV (mL) = 4*DEV (cm/s)*DCT (s)

Measurement operation procedure:

1. Roll the trackball to highlight **Valve Volume**, and press **Set**.
2. Measure DEV in the method of generic M-mode slope measurement.
3. Measure DCT in the method of generic M-mode time measurement.
4. After the measurement, the result of QMV is displayed in Measured Results.

8.1.3. Aortia

Aortia calculation is as below.

- Measurement items:

LAD/ AOD and Valve Volume

- Aortia calculation

In the M-cardiac measurement menu, roll the trackball to highlight **Aortia** to display the secondary menu.

✧ **LAD/AOD measurement**

1. Roll the trackball to highlight **LAD/AOD** and press **Set**.
2. Measure LAD and AOD respectively in the method of generic M-mode distance measurement.
3. The result is displayed in Measured Results.

✧ **AVSV measurement**

The calculation formula:

AVSV (mL) = MAVO1 (cm)+MAVO2 (cm)*ET (s)*50+AA (cm)

The measurement operation procedure:

1. Roll the trackball to highlight **Valve Volume** and press **Set**.
2. Measure MAVO1 in the method of generic M-mode distance measurement.
3. Measure MAVO2 in the method of generic M-mode distance measurement.
4. Measure AA in the method of generic M-mode distance measurement.
5. Measure LVET in the method of generic M-mode time measurement.
6. After the measurement, the result of AVSV is displayed in Measured Results.

8.1.4. LVMW, LVMWI

LVMW and LVMWI calculations are as below.

- Measurement items:

LVPWd, IVSTd and LVIDd

- The calculation formula

LVMW (g) = 1.04*[{IVSTd (cm) +LVIDd (cm) +LVPWd (cm)}^{3}-LVIDd^3 (cm)^3]-13.6

LVMWI = LVMW (g)/BSA (m)^2

- To calculate LVMW, LVMWI

1. In the M-cardiac measurement menu, roll the trackball to highlight **LVMW**, and press **Set**.
2. Measure LVPWd, IVSTd and LVIDd respectively following the prompt instruction.
3. After the measurements, the result of LVMW is displayed in Measured Results. The system displays LVWMI if you have keyed in Height and Weight before the measurement. If you measured LV before, the system renovates the LV results.

NOTE:

If the value of LVDId is smaller than that of LVDIs, the system will not display the results.

8.2. Cardiac Measurement and Calculation in B Mode

Press **Exam** to select cardiology and press **Set**.

In the B-mode, press **Measure**, the system enables B-mode cardiac measurement. The B-mode cardiac measurement menus are as shown below:

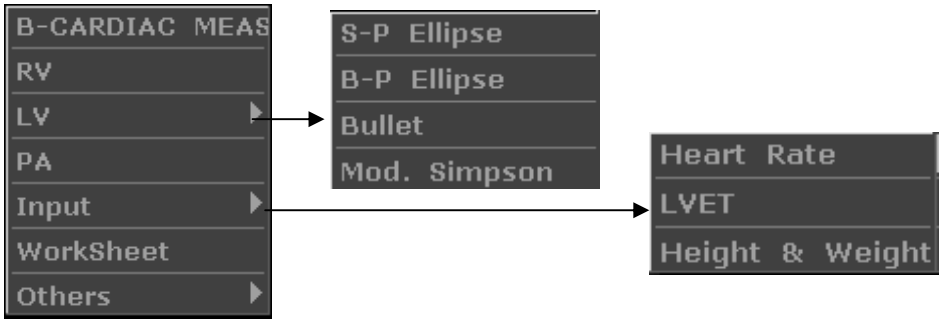


Figure 8-5 B Mode Cardiac Measurement and Calculation Menu

1. Items of Measurement and Calculation

B-CARDIAC MEAS: RV, LV, and PA.

2. Items of input

Heart Rate, LVET, and Height & Weight.

The default measurements are LVLs, LVALs, LVLd, and LVALd measurements with single-plane ellipse.

The formulas of B-mode cardiac LV measurement include Single plane ellipse, Dual plane ellipse, Bullet, and Modified Simpson, as shown below:

1. Single plane ellipse formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVLd	Left Ventricle Long-axle Diameter	Distance (mm)
LVALd	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
LVLs	Left Ventricle Long-axle Diameter	Distance (mm)
LVALs	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	EDV (mL)= $(8/3/\pi)\times\{LVALd\ (mm^2)\}^2/LVLd$ (mm) /1000
ESV	End Systolic Volume	ESV (mL)= $(8/3/\pi)\times\{LVALs\ (mm^2)\}^2/LVLs$ (mm) /1000
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) × HR (bpm)/1000
EF	Ejection fraction (B-mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 8-6 Measurement and Calculation Items with Single Plane Ellipse Formula

2. Dual plane ellipse formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVALd	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
LVAMd	Left Ventricular Fractional Area of Mitral Valve	
LVIDd	Left Ventricle Internal Diameter	Distance (mm)
LVALs	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
LVAMs	Left Ventricular Fractional Area of Mitral Valve	
LVIDs	Left Ventricle Internal Diameter	Distance (mm)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	EDV (mL)= $(8/3/\pi)\times\{LVALd\ (mm^2)\}^2/LVLd$ (mm) /1000
ESV	End Systolic Volume	ESV (mL)= $(8/3/\pi)\times\{LVALs\ (mm^2)\}^2/LVLs$ (mm) /1000
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) × HR (bpm)/1000
EF	Ejection fraction (B-mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 8-7 Measurement and Calculation Items with Dual Plane Ellipse Formula

3. Bullet volume formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVAMd	Left Ventricular Fractional Area of Mitral Valve	Ellipse Area (mm^2, cm^2, or dm^2)
LVLd	Left Ventricular Length	Distance (mm)
LVAMs	Left Ventricular Fractional Area of Mitral Valve	Ellipse Area (mm^2, cm^2, or dm^2)
LVLs	Left Ventricular Length	Distance (mm)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	EDV (mL)= (5/6)×LVLd (mm)×LVAMd (mm^2) /1000
ESV	End Systolic Volume	ESV (mL)= (5/6)×LVLs (mm)× LVAMs (mm^2) /1000
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) × HR (bpm)/1000
EF	Ejection fraction (B-mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 8-8 Measurement and Calculation Items with Bullet Formula

4. Modified SIMPSON formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVAMd	Left Ventricular Fractional Area of Mitral Valve	Ellipse Area (mm^2, cm^2, or dm^2)
LVLd	Left Ventricular Length	Distance (mm)
LVAPd	Left Ventricular Fractional Area of Papillary Muscles	Ellipse Area (mm^2, cm^2, or dm^2)
LVAMs	Left Ventricular Anterior Wall	
LVLs	Left Ventricular Length	Distance (mm)
LVAPs	Left Ventricular Fractional Area of Papillary Muscles	Ellipse Area (mm^2, cm^2, or dm^2)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	*1
ESV	End Systolic Volume	
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) x HR (bpm)/1000
EF	Ejection fraction (B-mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by to the selected formula (m^2)

Table 8-9 Measurement and Calculation Items with Modified SIMPSON Formula

*1

$$EDV\,(mL) = LVLd\,(mm)/9 \times \left\{4 \times LVAMd\,(mm^2) + 2 \times LVAPd\,(mm^2) + \sqrt{LVAMd\,(mm^2) \times LVAPd\,(mm^2)}\right\}/1000$$

$$ESV\,(mL) = LVLs\,(mm)/9 \times \left\{4 \times LVAMs\,(mm^2) + 2 \times LVAPs\,(mm^2) + \sqrt{LVAMs\,(mm^2) \times LVAPs\,(mm^2)}\right\}/1000$$

5. Other measurement and calculation items:

Label	Description	Method
LVET	Left Ventricular Ejection Time	Time (ms)
FS	Fractional Shortening	FS (No unit)={ LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm) x 100%
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit)= { LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) x ET (ms)/1000}

Table 8-10 Other Measurement and Calculation Items

8.2.1. LV

LV measurement is as below.

Single plane ellipse

- Measurement items:

  LVLs, LVALs, LVLd, and LVALd.

- To measure LV:

1. In the B-cardiac measurement menu, roll the trackball to highlight **LV**. Then select **S-P Ellipse** and press **Set**.
2. During end systolic, measure LVLs and LVALs respectively. The system calculates and displays ESV value.
3. During end diastolic, measure LVLd and LVALd in the method of generic B-mode distance measurement and generic B-mode ellipse area measurement respectively. The system calculates and displays EDV, SV, and EF.

Dual plane ellipse, Bullet, and Modified SIMPSON

The operations in these methods are similar to those in the single plane ellipse method. Please refer to the corresponding B-mode generic measure method for details, and you can use the prompt instruction to help you.

CO calculation is as below.

- Measurement and input items:

  Measure LV;

  Key in: HR

- To calculate CO:

1. In the B-cardiac measurement menu, roll the trackball to highlight **Input**, select the secondary menu **Heart Rate** and press **Set** to display a HR entering dialog box, as shown below.

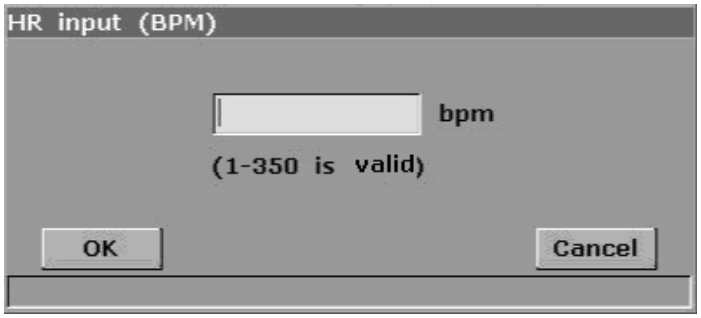


Figure 8-6 HR Inputting Dialog Box

2. Input a suitable value in the HR box.
3. Roll the trackball to highlight **OK** and press **Set**. After measuring LV, CO are displayed in Measured Results.

MVCF calculation is as below.

- Measurement and input items:

  Measure: LV;

  Key in: LVET

- To calculate MVCF:

1. Move the cursor to **Input**, select the secondary menu **LVET** and press **Set** to display an LVET entering dialog box, as shown below.

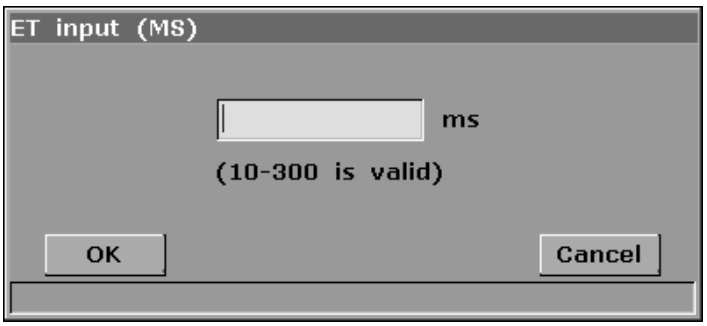


Figure 8-7 ET Inputting Dialog Box

2. Input a suitable value in the LVET box.
3. Roll the trackball to highlight **OK** and press **Set**. After measuring LV, MVCF are displayed in Measured Results.

CI and SI calculations are as below.

- Measurement and input items:

  Measure: LV and HR;

  Key in: Height and Weight

- To calculate CI and SI:

1. In the B-cardiac measurement menu, roll the trackball to highlight **Input**, select the secondary menu **Height & Weight** and press **Set** to display a Height, Weight entering dialog box, as shown below.

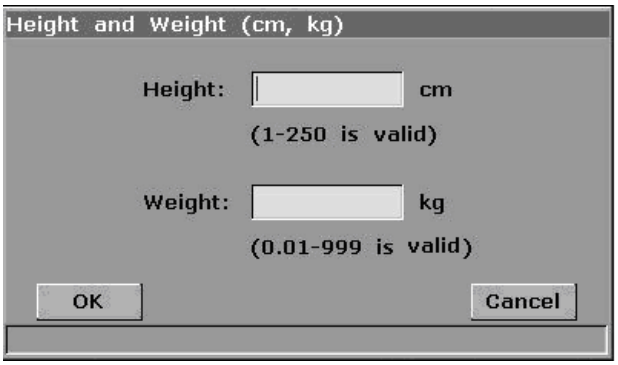


Figure 8-8 Height and Weight Inputting Dialog Box

2. Input suitable values in the Height and Weight boxes.
3. Roll the trackball to highlight **OK** and press **Set**. BSA is displayed in Measured Results. After measuring LV and HR, SI and CI are also displayed in Measured Results.

8.2.2. RV (Right ventricle internal diameter)

1. In the B-cardiac measurement menu, roll the trackball to highlight **RV**.
2. Measure RV with distance method.
3. The result is displayed in Measured Results.

8.2.3. PA (Aortic Pulmonary Artery)

1. In the B-cardiac measurement menu, roll the trackball to highlight **PA**, and press **Set** to display a "+" in the image area.
2. Measure **PA** in the method of distance measurement.
3. The result is displayed in Measured Results.

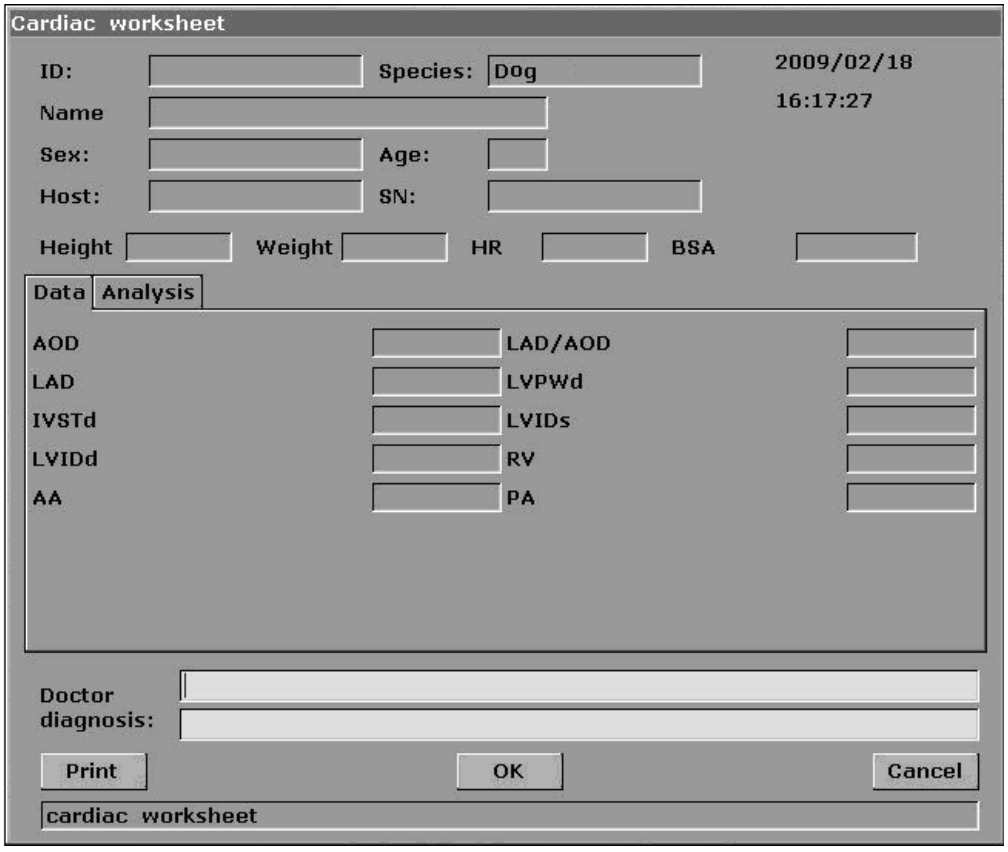
Other parameters:

If you want to do other cardiac parameter measurement, please enter B/M-mode or M-mode cardiac measurement.

The result of ventricle volume measurement is more exact in two-dimension. You can get the two-dimension heart image of end diastolic and end systolic exactly and conveniently in the B/M-mode. So we suggest that you can do the cardiac measurement and calculation in the B/M-mode.

8.3. Cardiac Report

After the cardiac examination, the system generates a cardiology examination and diagnosis worksheet. Roll the trackball to highlight **Worksheet**, and press **Set** to display **Cardiac Worksheet** dialog box, as shown below.



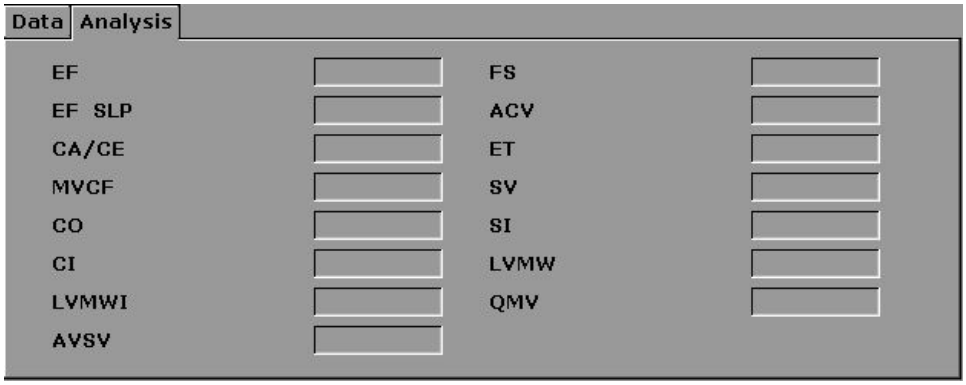


Figure 8-9 Dog Cardiac Worksheet

The diagnosis editing column displays the cursor "I", and you can enter diagnosis information.

NOTES:

1. The system displays the completed measurements and calculations. The uncompleted measurements and calculations are not displayed.

2. You can check the measured items by opening the obstetric worksheet dialog box whenever you want, during measurement or after that. Then press **OK** or **Cancel** to close the dialog box, and continue to measure.

To print the report:

Press **Print** in the Cardiac Worksheet.

Printing reference Section *5.8, Printing.*

Chapter 9 Inspection and Maintenance

CAUTION

The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal. Batteries are hazardous waste. Do not dispose them together with house-hold garbage. At the end of their life hand the batteries over to the applicable collection points for the recycling of waste batteries. For more detailed information about recycling of this product or battery, please contact your local Civic Office, or the shop where you purchased the product.

9.1. Daily Checklist

Check before the system is switched on:

- Visually inspect all the transducers. Do NOT use any damaged transducer.
- Visually inspect all the transducer assembly cables and associated connectors.
- Visually inspect all the power cords. Do NOT turn on the power if a cord is frayed or split, or shows signs of wear.
- Verify that the trackball is clean and free from gel or contaminants.

Check after the system is switched on:

- Visually check the on-screen display and lighting. Verify that the monitor displays the current date and time. There isn't any error message.
- Verify that the transducer identification and indicated frequency on the screen are correct for the activated transducer.
- Ensure that there isn't obvious abnormal noise, discontinuous image or dark area.
- Ensure that it isn't smelly or too hot.
- Ensure that the ultrasound window isn't too hot, checking with your hand.
- Verify that the buttons and knobs on the keyboard are good to operate.

9.2. Cleaning and Disinfection

All exterior parts of the device, including the control panel, probes, and puncture needle, should be cleaned and/or disinfected as necessary or between uses with a recommended cleaner or disinfectant. Clean each part to remove any surface particles. Disinfect the parts to kill vegetative organisms and viruses.

You must take all necessary precautions to eliminate the possibility of exposing patients, operators or third parties to hazardous or infectious materials. Use universal precautions during cleaning and disinfection. You should treat all parts of the device that come in contract with human blood or other body fluids as they were known to be infectious.

After use, clean the outer shell of the device with soft and dry cloth gently. Medical cotton ball immerged with a 75% medical alcohol solution should be used to wipe probes gently and thoroughly.

The cleaning of internal components of the device should be performed by authorized and qualified personnel.

WARNING

1. To avoid electrical shock and damage to the system, always shut down and disconnect the device from the AC power source before cleaning and disinfection.
2. To avoid infection, always use protective gloves when performing cleaning and disinfecting procedures.
3. To avoid infection, ensure that the solution expiration date has not passed.

CAUTION

1. Be careful when cleaning the display screen. Since the display screen is easily scratched or damaged, we should wipe it with a soft and dry cloth.
2. To avoid the possibility of electrostatic shock and damage to the system, avoid the use of aerosol spray cleaners on the monitor.
3. Do NOT clean the internal base of the device.
4. Do NOT clean the system with chlorinated or aromatic solvents, acidic or basic solutions, isopropyl alcohol or strong detergents such as ammoniated products as they may damage the surface of the system.
5. Do NOT use spray detergents on the system or it may force cleaning fluid into the system and damage electronic parts. Solvent fumes build up and form flammable gases or damage internal parts.
6. Do NOT pour any fluid onto the system surface, as fluid seepage into the electrical circuitry may cause excessive leakage current or system failure.
7. Do NOT leave residual detergent on the surface of the device.

9.2.1. System Surface Cleaning

To clean the system surface:

1. Power off the system and disconnect it from power supply.
2. Use a clean gauze pad or lint-free cloth, moistened lightly with a mild detergent, to wipe the surface.
3. After cleaning, reconnect the system to power source.

CAUTION

Make sure the cleaning solution does not seep into the control panel or any other openings.

NOTES:

1. Take particular care when cleaning the areas near track ball and the slide controls.
2. Make sure they are free of gel and any other visible residue.

9.2.2. Probe and Probe Holder Cleaning and Disinfecting

To clean probe holder:

1. Turn the probe holder upwards and then lift the holder out of the system enclosure.
2. Wash the holder with flowing water, using a mild detergent.
3. After cleaning and drying, turn the holder downwards to lock it.

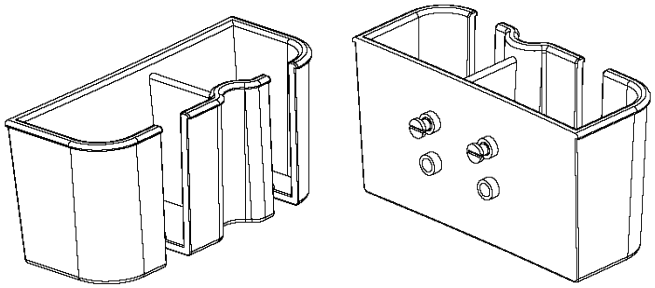


Figure 9-1 Probe Holder

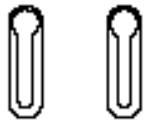


Figure 9-2 Probe Holder Pothook

Probe cleaning and/or disinfection:

◆ C361-1, C611, L741, C321-1 and C341:

Every time before using it, layers of medical ultrasound coupling gel should be applied evenly on the area of the acoustical window of the probe, and the instrument is ready for operation. Be careful not to generate any air bubble. Disinfection should be performed each time after use.

1. Wipe off the residual coupling gel gently.
2. Use a medical cotton ball immerged with 75% medical alcohol to wipe the probe gently and thoroughly.
3. Wipe the probe with a soft cloth soaked with distilled water.

◆ V741 and V561:

The single-use sheath should be used on V741 and V561 probe.

CAUTION

We recommend that the single-use sheath should be CE marked or FDA 510(k) cleared.

Every time before using it, layers of medical ultrasound coupling gel should be applied evenly on

the area of the acoustical window of the probe. Then put on a single-use sheath, and the instrument is ready for operation. Be careful not to generate any air bubble. Disinfection should be performed each time after use.

1. Remove the sheath gently, and discard it.
2. Wipe off the residual coupling gel gently.
3. Use a medical cotton ball immerged with 75% medical alcohol to wipe the probe gently and thoroughly.
4. Wipe the probe with a soft cloth soaked with distilled water.

Prohibition

The use of diluent paint, vinyl oxide or other organic solvents is prohibited. These solvents will damage the protective film of the probe surface.

Do NOT immerse the transducer connector. If the cable connector is immersed, do NOT plug the connector into the system. Rinse the connector under running water and dry it thoroughly. If necessary, contact the manufacturer for service.

Prohibit infiltration of any type of liquid into the device or the probe.

WARNING

1. Do NOT sterilize the transducer using techniques such as autoclave, ultraviolet, gamma radiation, gas, steam, or heat. Severe damage will result.
2. The coupling gel adapted to the probe is a medial ultrasound coupling gel.
3. Do NOT immerse the power cord and connector of the probe into solutions. Transducers can be submerged to, but not including, the strain relief of the transducer array. Do NOT immerse or soak any part of a transducer in any cleaning material not listed in the recommended list of disinfectants. The following figure defines how much of the transducer can be submerged.

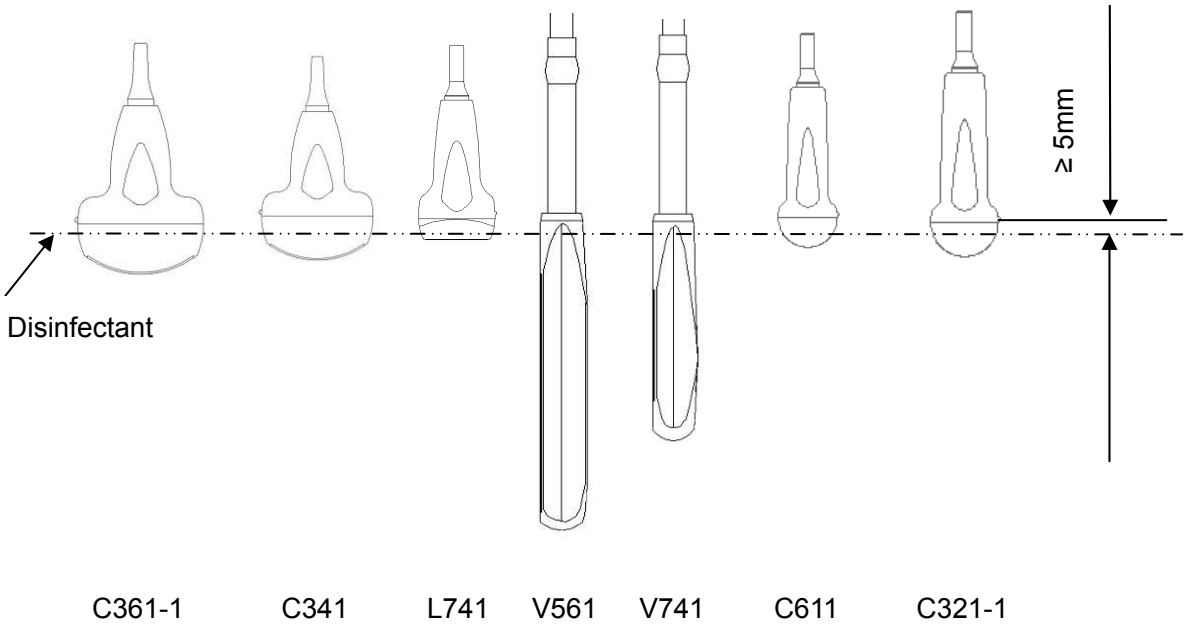


Figure 9-3 Depth of the Probe Immerged into Disinfectant

Proper Use of Probes

In order to extend the service life and to obtain optimum performance of the probe, please operate as follows:

1. Inspect power cord, socket and acoustical window of the probe periodically.
2. Shut down the machine before connecting or disconnecting the probe.
3. Do NOT drop the probe onto the floor or collide with hard objects. Otherwise it will be damaged easily.
4. When the probe is not used, put it in the probe holder.
5. Heating the probe is strictly forbidden.
6. Pulling or bending the power cord of the probe is strictly forbidden; otherwise internal connecting lines of the power cord may rupture.
7. Coupling gel can only be used on the head of the probe, and it should be wiped off after use.
8. Each time after use, clean and disinfect the probe.
9. The acoustical window and the shell of the probe should be examined frequently.

WARNING

The DUS 3 VET cannot be used together with high-frequency surgical equipment.

CAUTION

1. Do NOT disinfect or clean probes under high temperature, and the temperature should be below 45 °C.
2. In order to avoid damaging the device, the disinfection method is limited to regular maintenance of devices in hospitals. Disinfecting instruments should be cleaned first.

9.2.3. Needle Guide Cleaning and Disinfecting

NOTES:

1. Use proper disinfection technique at all times to perform a biopsy.
2. Disinfect the needle guide before the first use and after each subsequent use.

Cleaning

You should preclean a Needle Guide before disinfecting.

To clean a Needle Guide, use a brush or cloth that has been damped with soap and water or with a specialized soap and precleaner.

Disinfecting

Always disinfect the Needle Guide after use.

9.2.4. Trackball Cleaning

To clean the trackball:

1. Remove the front panel bezel.
2. Remove the trackball as shown in figure 9-4.

Figure 9-4 Trackball with Top Fixation Ring

3. Clean trackball with a tissue and isopropyl alcohol.
4. Clean the inside of the trackball assembly with a cotton swab and isopropyl alcohol.

   NOTE:

   Make sure to clean the X and Y encoders and the idler wheel.

5. Assemble the trackball and front panel bezel till the assembly parts completely dry.

CAUTION

Do NOT drop or place foreign objects inside the trackball assembly or it may affect the trackball operation and damage the system.

9.2.5. Disinfectants

Probe: 75% medical alcohol, Cidex (2.4%), Cidex OPA (0.55%).

Needle guide: 75% medical alcohol, Cidex (2.4%).

WARNING

Be sage to choose the cleaners and disinfectants. The concentration in the air must not exceed an applicable specified limit. Comply with the manufacturer's instructions when using the cleaners and disinfectants.

9.3. Maintenance

Maintenance must be performed every 12 months, including safety and functionality of the system.

The following safety checks should be performed at least every 12 months by a qualified person who has adequate training, knowledge, and practical experience to perform these tests.

- Inspect the safety-related labels for legibility.
- Inspect the fuse to verify compliance with rated current and breaking characteristics.
- Verify that the device functions properly as described in the instructions for use.
- Test the protection earth resistance according to IEC/EN 60601-1: Limit: 0Ω~ 0.1 Ω.
- Test the earth leakage current according to IEC/EN 60601-1: Limit: NC 500 μA ~ SFC 1000 μA.
- Test the patient leakage current according to IEC/EN 60601-1: Limit: NC 100 μA ~ SFC 500 μA.
- Test the Covers leakage current according to IEC/EN 60601-1: Limit: NC 100 μA ~ SFC 500 μA.
- The leakage current should never exceed the limit.

The data should be recorded in an equipment log. If the device is not functioning properly or any of the above tests fail, please contact the maintenance person of the manufacturer.

Chapter 10 Troubleshooting

10.1. Checkup

- Check whether the power supply works properly and the power cord is well connected and plugged into the power socket.
- Check whether the probe is properly connected to the main unit.

10.2. Troubleshooting

- Changing the cartridge fuse (by the professional personnel of the manufacturer).
- Troubleshooting (see table 10-1)

No.	Problem	Solution
1	When the power switch is on, the indicator light keeps off and without image displayed.	1. Check power supply. 2. Check wires and plugs. 3. Check whether the cartridge fuse is melted. 4. Check the brightness control knob.
2	Strip-shape or snowflake-shape disturbance occurs on the display screen.	1. Inspect the power supply. 2. Check whether it is disturbed by the ignition action of any other device. 3. Check the disturbance of electric or magnetic field in the surrounding environment. 4. Check whether the plug and socket of power supply and probe are properly connected.
3	Image is not displayed clearly on the screen.	1. Adjust overall gain (Gain). 2. Adjust TGC. 3. Adjust the brightness and contrast potentiometer. 4. Adjust focus (the number and the position). 5. Clean the light filter of the display screen.
4	Near-field image is not clear.	Adjust the total gain and the upper TGC
5	Far-field image is not clear.	Adjust the total gain and the lower TGC
6	Image window is dark.	Adjust the brightness and contrast knobs.

Table 10-1 Troubleshooting Examples

Chapter 11 Warranty and Service Policy

11.1. Warranty

EDAN warrants that EDAN's products meet the labeled specifications of the products and will be free from defects in materials and workmanship that occur within warranty period. The warranty period begins on the date the products are shipped to distributors.

The warranty is void in cases of:

- Damage caused by handling during shipping.
- Subsequent damage caused by improper use or maintenance.
- Damage caused by alteration or repair by anyone not authorized by EDAN.
- Damage caused by accidents.
- Replacement or removal of serial number label and manufacture label.

If a product covered by this warranty is determined to be defective because of defective materials, components, or workmanship, and the warranty claim is made within the warranty period, EDAN will, at its discretion, repair or replace the defective part(s) free of charge. EDAN will not provide a substitute product for use when the defective product is being repaired.

11.2. Service Policy

All repairs on products must be performed or approved by EDAN. Unauthorized repairs will void the warranty. In addition, whether or not covered under warranty, any product repair shall be exclusively be performed by EDAN certified service personnel.

If the product fails to function properly or if you need assistance, service, or spare parts, contact EDAN's service center. A representative will assist you in troubleshooting the problem and will make every effort to solve it over the phone or Email, avoiding potential unnecessary returns.

In case a return can not be avoided, the representative will record all necessary information and will provide a Return Material Authorization (RMA) form that includes the appropriate return address and instructions. An RMA form must be obtained prior to any return.

Freight policy

Under warranty: the service claimer is responsible for freight & insurance charges when a retrun is shipped to EDAN for service including custom charges. EDAN is responsible for freight, insurance & custom charges from EDAN to service claimer.

Out of warranty: the service claimer is responsible for any freight, insurance & custom charges for product.

Contact information

If you have any question about maintenance, technical specifications or malfunctions of devices, contact your local distributor.

Alternatively, you can send an email to EDAN service department at: support@edan.com.cn.

Appendix I: Technical Specifications

A1.1: Electrical Safety Classifications

According to the type of protection against electric shock	Equipment without internal power source, Class I equipment
According to the degree of protection against electric shock	Type B
According to the degree of protection against harmful ingress of liquid	Whole equipment: IPX0; Probes : IPX7; waterproof
According to the degree of safety of application in the presence of a flammable gas	Equipment not suitable for use in the presence of a flammable gas
According to the mode of operation	Continuous operation
According to the grade of EMC	Group I, Class A

A1.2: Standards Compliance

Standard	**Description**
IEC 60601-1:1988+A1+A2 EN 60601-1:1990+A1+A2	Medical electrical equipment; Part 1: General requirements for safety
IEC/EN 60601-1-2:2001+A1	Medical electrical equipment-Part 1-2: General requirements for safety-Collateral standard: Electromagnetic compatibility -Requirements and tests
IEC/EN 60601-1-4	Medical electrical equipment - Part 1-4: General requirements for safety - Collateral standard: Programmable electrical medical systems
IEC/EN 60601-2-37	Medical electrical equipment-Part 2-37: Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment
IEC/EN 61157	Requirements for the declaration of the acoustic output of medical diagnostic ultrasonic equipment

A1.3: Power Supply

Operating Voltage	100 V-240 V~
Operating Frequency	50 Hz/60 Hz
Input Power	110 VA

A1.4: Machine Specifications

Main unit dimensions	353 mm (W) × 315 mm (L) × 253 mm (H)
Packaging dimensions	500 mm (W) × 460 mm (L) × 465 mm (H)
Net weight	11.5 kg

A1.5: General Technical Specifications

Monitor	10-inch non-interlaced progressive scanning black and white monitor
Resolution	800×575 pixels
Display Modes	B, B+B, 4B, B+M, and M
Image Gray Scale	256 levels
Image Magnification	In area Real time: 100%、144%、196%、256%、400%、576%、900%、1600% Frozen (only available in B mode): 100%、178%、400%、1600%
Storage	56 MB
Depth Shift	B, B+B, 4B, B+M, M-modes in real time, in increments of 10 mm
Image Conversion	Up/Down flip, Left/Right flip, 90° Rotate
Language Conversion	Chinese, English, French, German, Spanish, Italian, Polish, Russian, etc. (The language options varies with language software installed.)
Focus position	16 levels to adjust
Focus number	Max. 4
Software packages	Abdomen, obstetric, small parts, and cardiology
B-mode Measurement	Distance, circumference, area, volume, ratio, % stenosis, histogram and angle

M-mode Measurement	Distance, time, slope, heart rate (2 cycles)
Body Mark	18 types
USB port	USB 1.1

A1.6: Probe Specifications

Supported probe type: convex, linear, micro-convex, endocavity (endorectal).

This device can detect the probe automatically.

Model	Application	Central frequency	Frequencies	Length of cable
C611 (R10)	Abdomen / Obstetrics	6.5 MHz（R10）	4.5 MHz/ 5.5 MHz/ 6.5 MHz/ 7.5 MHz/ 8.5 MHz	2 m
C361-1 (R60)	Abdomen / Obstetrics	3.5 MHz（R60）	2.0 MHz/ 3.0 MHz/ 4.0 MHz/ 5.0 MHz/ 6.0 MHz	
C341 (R40)	Abdomen / Obstetrics	3.5 MHz（R40）	2.0 MHz/ 3.0 MHz/ 4.0 MHz/ 5.0 MHz/ 6.0 MHz	
C321-1 (R20)	Abdomen / Obstetrics / Cardiology	3.5 MHz（R20）	4.0 MHz/ 5.0 MHz/ 6.0 MHz	
L741 (L40)	Small parts (breast, thyroid, testes) / Peripheral Vascular / Musculo-skeletal (both Conventional and Superficial)	7.5 MHz（L43）	6.0 MHz/ 7.0 MHz/ 8.0 MHz/ 9.0 MHz/ 10.0 MHz	
V741 (L40)	large animal reproductive system	7.5 MHz（L40）		(2200±50) mm
V561 (L60)	large animal reproductive system	5.0 MHz（L60）	3.0 MHz/ 4.0 MHz/ 5.0 MHz/ 6.0 MHz/ 7.0 MHz	

A1.7: Operating, Storage and Transportation Environment

A1.7.1. Operating Environment

Temperature	+5 °C ~ +40 °C
Relative humidity range	25% RH ~ 80% RH
Atmospheric pressure range	860 hPa ~ 1060 hPa
Maximum altitude	2 km
Note: Don't power on the machine immediately after it's moved to another place where the temperature is lower than 5℃ or higher than 40℃. Wait about one hour every 5℃ increased or decreased.	

A1.7.2. Storage and Transportation Environment

Temperature	-40 °C ~ +55 °C
Relative humidity range	25% RH ~ 93% RH
Atmospheric pressure range	700 hPa ~ 1060 hPa
Maximum altitude	3 km

Appendix II: Ultrasound Intensity and Safety

A2.1: Ultrasound in Medicine

The use of diagnostic ultrasound has proved to be a valuable tool in medical practice. Given its known benefits for non-invasive investigations and medical diagnosis, including investigation of the human fetus, the question of clinical safety with regards to ultrasound intensity arises.

There is no easy answer to the question of safety surrounding the use of diagnostic ultrasound equipment. Application of the ALARA (As Low As Reasonably Achievable) principle serves as a rule-of-thumb that will help you to get reasonable results with the lowest possible ultrasonic output.

The American Institute of Ultrasound in Medicine (AIUM) states that given its track record of over 25 years of use and no confirmed biological effects on patients or instrument operators, the benefits of the prudent use of diagnostic ultrasound clearly outweigh any risks.

A2.2: Ultrasound Safety and the ALARA Principle

Ultrasound waves dissipate energy in the form of heat and can therefore cause tissue warming. Although this effect is extremely low with Transcranial Doppler, it is important to know how to control and limit patient exposure. Major governing bodies in ultrasound have issued statements to the effect that there are no known adverse effects from the use of diagnostic ultrasound, however, exposure levels should always be limited to As Low As Reasonably Achievable (the ALARA principle). You can control the ultrasonic power or patient exposure to ultrasound in any of the following three ways:

- Adjust the pulse strength (amplitude)
- Adjust the duration of the pulse (pulse duration)
- Adjust the pulse rate (pulse repetition frequency or PRF)

To change these settings for your system, use the following controls:

Amplitude

The power setting directly influences the amplitude of the pulse burst. A higher setting increases the amplitude, resulting in a higher ultrasound output at the transducer.

Sample Volume

The Sample volume is the axial length of the area from which the Doppler signals are obtained. The larger the sample volume, the longer the duration of the pulse burst, and consequently the higher the ultrasound output and power.

Spectrum Velocity Scale

The higher the scale setting, the higher the pulse repetition frequency (number of pulses per second), and consequently higher ultrasound output. More pulses per second are equivalent to a higher power output.

Proper use of these instrument settings can minimize patient exposure, and optimize the results and efficiency of the equipment.

Always apply the ALARA principle; use power levels that are: As Low As Reasonably Achievable.

Imaging Functions Affecting Acoustic Output

In addition to the level of voltage transmitted, adjustment of the following imaging functions and /or controls may affect the acoustic output.

Item	Affection
Probe	Acoustic output is changed as changing probes.
Imaging mode	There are different parameters applied in B mode and M mode, so acoustic output will be changed as changing between B mode and M mode. Generally, the acoustic output of M mode is lower than the B mode.
Field of view (scan angle or scan width)	Frame rate may be changed as changing the scan angle of the scan width, and the acoustic output will be changed.
Image depth	Pulse repeated frequency will be changed as changing the image depth, and the acoustic output will be changed.
Focus number	Frame rate and focus position will be changed as changing the focus number, and acoustic output will be changed.
Focus position	Acoustic output will be changed as changing the focus position even the beam power level and the beam aperture have not been changed. Generally, the acoustic output will be higher as getting nearer to probe.
Freeze	When freezing the system, it will stop transmitting ultrasonic wave.
Transmission power	The output of probe will be changed as changing the transmission power, and acoustic output will be changed.
Multi-frequency	The character of the wave focus will be changed as changing the frequency, and acoustic output will be changed.
Line density	The acoustic output will be changed as changing the number of the scanning line (line density).
Presets	Presets contain all the parameters above, so any change of the presetting will change acoustic output.
Restart, or power on/off	System will return to the default set when restarting, or powering on/off the system, and acoustic output will be changed.

A2.3: Probe Acoustic Output Parameters List

A2.3.1. Test of Probe C611

Test Item	B	B+M
p-, MPa	1.706	1.706
$I_{spta,}$ mW/cm^2	7.981	9.2845
MI	0.354	0.354
System settings	*1	*2
$Z_{p,}$ mm	12.4648	12.4648
$W_{pb6,}$ (∥), mm (⊥), mm	1.631 1.937	1.631 1.937
prr, kHz	7.535	2.736
srr, Hz	49	29
Output beam Dimensions, cm^2	0.544	0.544
$f_{awf,}$ MHz	8.09	7.5
APF, %	67.1	67.1
AIF, %	67.1	67.1
Maximum power, mW	5.273	2.0619
$I_{ob,}$ mW/cm^2	9.69	3.79
Power-up mode	B mode	B mode
Initialization mode	B mode	B mode
Acoustic output freeze	Yes	Yes
Z_{tt} (mm)	--	--
Z_{ts} (mm)	contact	contact
Inclusive modes	--	--

Note: APF: Acoustic power-up fraction, AIF: Acoustic initialization fraction;

*1: AP=15; Depth=30 mm; Focus=20 mm; scan angle=78°; Frequency=7.5 MHz;

*2: AP=15; Depth=30 mm; Focus=20 mm; Frequency=7.5 MHz

A2.3.1: Test of Probe C361-1

Test Item	B	B+M
p-, MPa	1.709	1.709
$I_{spta,}$ mW/cm^2	35.5584	43.1241
MI	0.5574	0.5574
System settings	*1	*2
$Z_{p,}$ mm	23.39	23.39
$W_{pb6,}$ (∥), mm (⊥), mm	2.591 4.327	2.591 4.327
prr, kHz	7.535	2.735
srr, Hz	47	29
Output beam Dimensions, cm^2	1.9155	1.9155
$f_{awf,}$ MHz	3.091	3.0
APF, %	77.71	77.71
AIF, %	77.71	77.71
Maximum power, mW	68.36	26.725
$I_{ob,}$ mW/cm^2	35.69	13.95
Power-up mode	B mode	B mode
Initialization mode	B mode	B mode
Acoustic output freeze	Yes	Yes
Z_{tt} (mm)	--	--
Z_{ts} (mm)	contact	contact
Inclusive modes	--	--

Note: APF: Acoustic power-up fraction, AIF: Acoustic initialization fraction;

*1: AP=15; Depth=60 mm; Focus=50 mm; Angle=30°; Frequency=3.0 MHz;

*2: AP=15; Depth=60 mm; Focus=50 mm; Frequency=3.0 MHz

A2.3.2: Test of Probe L741

Test Item	B	B+M
p-, MPa	2.975	2.975
$I_{spta,}$ mW/cm^2	54.2219	65.7585
MI	0.6667	0.6667
System settings	*1	*2
$Z_{p,}$ mm	14.3401	14.3401
$W_{pb6,}$ (∥), mm (⊥), mm	1.438 1.56	1.438 1.56
prr, kHz	7.001	2.736
srr, Hz	47	29
Output beam Dimensions, cm^2	0.48	0.48
$f_{awf,}$ MHz	6.033	8.0
APF, %	75.9	75.9
AIF, %	75.9	75.9
Maximum power, mW	13.44	5.6562
$I_{ob,}$ mW/cm^2	28	11.78
Power-up mode	B mode	B mode
Initialization mode	B mode	B mode
Acoustic output freeze	Yes	Yes
Z_{tt} (mm)	--	--
Z_{ts} (mm)	contact	contact
Inclusive modes	--	--

Note: APF: Acoustic power-up fraction, AIF: Acoustic initialization fraction;

*1: AP=15; Depth=80 mm; Focus=30 mm; Frequency=8.0 MHz;

*2: AP=15; Depth=80 mm; Focus=30 mm; Frequency=8.0 MHz

A2.3.3: Test of Probe C341

Test Item	B	B+M
p-, MPa	1.294	1.294
$I_{spta,}$ mW/cm^2	15.1854	19.6719
MI	0.3679	0.3679
System settings	*1	*2
$Z_{p,}$ mm	23.388	23.388
$W_{pb6,}$ (∥), mm (⊥), mm	2.9 2.635	2.9 2.635
prr, kHz	5.938	2.736
srr, Hz	44	29
Output beam Dimensions, cm^2	1.9152	1.9152
$f_{awf,}$ MHz	3.4211	4.0
APF, %	108	108
AIF, %	108	108
Maximum power, mW	27.62	13.7069
$I_{ob,}$ mW/cm^2	14.42	7.16
Power-up mode	B mode	B mode
Initialization mode	B mode	B mode
Acoustic output freeze	Yes	Yes
Z_{tt} (mm)	--	--
Z_{ts} (mm)	contact	contact
Inclusive modes	--	--

Note: APF: Acoustic power-up fraction, AIF: Acoustic initialization fraction;

*1: AP=15; Depth=100 mm; Focus=100 mm; Angle=49°; Frequency=4.0 MHz;

*2: AP=15; Depth=100 mm; Focus=100 mm; Frequency=4.0 MHz

A2.3.4: Test of Probe C321-1

Test Item	B	B+M
p-, MPa	1.326	1.326
$I_{spta,}$ mW/cm^2	19.8099	24.0249
MI	0.4874	0.4874
System settings	*1	*2
$Z_{p,}$ mm	16.5586	16.5586
$W_{pb6,}$ (∥), mm (⊥), mm	2.495 4.949	2.495 4.949
prr, kHz	7.536	2.736
srr, Hz	47	29
Output beam Dimensions, cm^2	0.96	0.96
$f_{awf,}$ MHz	3.3159	4.0
APF, %	69.5	69.5
AIF, %	69.5	69.5
Maximum power, mW	30.43	11.8979
$I_{ob,}$ mW/cm^2	31.7	12.39
Power-up mode	B mode	B mode
Initialization mode	B mode	B mode
Acoustic output freeze	Yes	Yes
Z_{tt} (mm)	--	--
Z_{ts} (mm)	contact	contact
Inclusive modes	--	--

Note: APF: Acoustic power-up fraction, AIF: Acoustic initialization fraction;

*1: AP=15; Depth=50 mm; Focus=50 mm; Angle=46°; Frequency=4.0 MHz;

*2: AP=15; Depth=50 mm; Focus=50 mm; Frequency=4.0 MHz;

A2.3.5: Test of Probe V741

Test Item	B	B+M
p-, MPa	2.372	2.372
$I_{spta,}$ mW/cm^2	47.6797	57.8243
MI	0.6212	0.6212
System settings	Control1	Control2
$Z_{p,}$ mm	11.7087	11.7087
$W_{pb6,}$ (∥), mm (⊥), mm	1.515 1.498	1.515 1.498
prr, kHz	5.736	2.736
srr, Hz	47	29
Output beam Dimensions, cm^2	0.48	0.48
$f_{awf,}$ MHz	5.5603	6.0
APF, %	73.2	73.2
AIF, %	73.2	73.2
Maximum power, mW	9.081	4.6645
$I_{ob,}$ mW/cm^2	18.9	9.72
Power-up mode	B mode	B mode
Initialization mode	B mode	B mode
Acoustic output freeze	Yes	Yes
Z_{tt} (mm)	--	--
Z_{ts} (mm)	contact	contact
Inclusive modes	--	--

Note:

APF: Acoustic power-up fraction, AIF: Acoustic initialization fraction

*1: AP=15; Depth=60 mm; Focus=30 mm; Frequency=6.0 MHz;

*2: AP=15, Depth=60 mm; Focus=30 mm; Frequency=6.0 MHz

A2.3.6: Test of Probe V561

Test Item	B	B+M
p-, MPa	2.052	2.052
$I_{spta,}$ mW/cm^2	51.4948	62.4511
MI	0.4512	0.4512
System settings	Control1	Control2
$Z_{p,}$ mm	14.34	14.34
$W_{pb6,}$ (∥), mm (⊥), mm	2.501 2.918	2.501 2.918
prr, kHz	7.006	2.736
srr, Hz	47	29
Output beam Dimensions, cm^2	0.72	0.72
$f_{awf,}$ MHz	4.4105	5.0
APF, %	81.58	81.58
AIF, %	81.58	81.58
Maximum power, mW	36.65	15.408
$I_{ob,}$ mW/cm^2	50.9	21.4
Power-up mode	B mode	B mode
Initialization mode	B mode	B mode
Acoustic output freeze	Yes	Yes
Z_{tt} (mm)	--	--
Z_{ts} (mm)	contact	contact
Inclusive modes	--	--

Note:

APF: Acoustic power-up fraction, AIF: Acoustic initialization fraction

*1: AP=15; Depth=80 mm; Focus=60 mm; Frequency=5.0 MHz;

*2: AP=15, Depth=80 mm; Focus=50 mm; Frequency=5.0 MHz

Appendix III: Obstetrical References

Dog

Standard MA: 64 days

MA(day)=(3*CRL(cm))+27, less than 40 days;

MA(day)=(6*GSD(cm))+20, less than 40 days;

MA(day)=(15*HD(cm))+20, more than 40 days;

MA(day)=(7*BD(cm))+29, more than 40 days;

MA(day)=(6*HD(cm))+(3*BD(cm))+30, more than 40 days.

Reference: Veterinarian Ultrasounography; Xie Fuqiang; China Agricultural Science & Technology University Publication; No. 1, March, 2004, first edition.

Cat

Standard MA: 58 days

MA(day)=(11*BD(cm))+21;

MA(day)=(25*HD(cm))+3.

Reference: Veterinarian Ultrasounography; Xie Fuqiang; China Agricultural Science & Technology University Publication; No. 1, March, 2004, first edition.

Equine

Standard MA: 330 days

MA(day)=(GSD-H(cm)+0.55)/ 0.15;

MA(day)=(GSD-V(cm)+0.10)/ 0.14.

Reference: F.S. Pipers, DVM, PHD; W. Zent, DVM; R. Holder, DVM; A. Asbury, DVM. Ultrasounography as an adjunct to pregnancy assessments in the mare. JAMA, Vo; 184, No. 3, February 1, 1984.

Bovine:

Standard MA: 285 days

MA(day)=InCRL(cm)*16.73+27.5, 50 days before;

MA(day)=InTD(cm)*37.21+39.7, 50 days later;

MA(day)=InHD(cm)*45.23+37.7, 50 days later;

Reference: PRACTICAL APPLICATION OF ULTRASOUND IN BOVINE EMBRYO TRANSFER. W.E Beal. Department of Animal and Poultry Sciences. Virginia Tech, Blacksburg, VA 24061.

Ovine:

Standard MA: 145 days

MA(day)=14.05+1.16*CRL(cm)- 0.012*CRL(cm)^2, 20~40 days;

MA(day)=21.4+1.85*BPD(mm), more than 40 days.

Reference: SCHRICK, F. N., INSKEEP, E.K. 1993: Determination of early pregnancy in ewes utilizing transrectal ultrasonography. Theriogenology 40: 295-306.

Others

Same as Dog

Standard MA: 64 days

MA(day)=(3*CRL(cm))+27, less than 40 days;

MA(day)=(6*GSD(cm))+20, less than 40 days;

MA(day)=(15*HD(cm))+20, more than 40 days;

MA(day)=(7*BD(cm))+29, more than 40 days;

MA(day)=(6*HD(cm))(3*BD(cm))+30, more than 40 days.

Reference: Veterinarian Ultrasounography; Xie Fuqiang; China Agricultural Science & Technology University Publication; No. 1, March, 2004, first edition.

Appendix IV: Measurement Accuracy

Parameter	Range	Accuracy
Image depth range	3.5MHz/R60,2.0MHz/3.0MHz/ 4.0MHz/5.0MHz/6.0MHz: 19mm~245mm 3.5MHz/R40,2.0MHz/3.0MHz/ 4.0MHz/5.0MHz/6.0MHz: 19mm~245mm 7.5MHz/L40,6.0MHz/7.0MHz/ 8.0MHz/9.0MHz/10.0MHz: 29mm~108mm 6.5MHz/R10,4.5MHz/5.5MHz/ 6.5MHz/7.5MHz/8.5MHz: 29mm~167mm 3.5MHz/R20, 4.0MHz/5.0MHz/6.0MHz 19mm~245mm	<±5% of full scale
M-mode time rage options	0, 1 ,2, 3	<±3% of full scale
Two-dimension Measurement		
Distance/depth	up to 250 mm	< ±5% or < 2 mm, if below 40 mm
Area (Trace)	up to 720 cm^2	< ±8% or < 130 mm^2, if below 1600 mm^2
Area (Ellipse)	up to 720 cm^2	< ±8% or < 130 mm^2, if below 1600 mm^2
Angle	0º to 180º	< ±3% on 1/2 segment
Ratio (A>B)		
-Result B/A and (A-B)/A -Result A/B	up to 1.0 1.0 to 99.9	< ±10% of A < ±10% of A
Time Motion (TM) Measurement		
Depth	up to 250 mm	< ±5% or < 2 mm, if below 40 mm
Time	up to 25 sec	< ± 5%
Heart rate	15 to 999 bpm	< ±5%
Velocity (ratio)	up to 999 mm/sec	< ±5%
Volume Measurement		
Volume (area, length, diameter)	up to 999 cm^3	< ±12% or <8000 mm^3, if below 64000 mm^3

Appendix V: EMC Information-Guidance and Manufacture's Declaration

Guidance and manufacture's declaration-electromagnetic emissions- For all EQUIPMENT and SYSTEMS

<table>
<tr><th colspan="3">Guidance and manufacture's declaration-electromagnetic emission</th></tr>
<tr><td colspan="3">The DUS 3 VET is intended for use in the electromagnetic environment specified below; The customer or the user of the DUS 3 VET should assure that it is used in such and environment.</td></tr>
<tr><th>Emission test</th><th>Compliance</th><th>Electromagnetic environment-guidance</th></tr>
<tr><td>RF emissions
CISPR 11</td><td>Group 1</td><td>The DUS 3 VET uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td></tr>
<tr><td>RF emissions
CISPR 11</td><td>Class A</td><td rowspan="3">The DUS 3 VET is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies building used for domestic purposes.</td></tr>
<tr><td>Harmonic emissions
IEC 61000-3-2</td><td>Class A</td></tr>
<tr><td>Voltage fluctuations/flicker emissions
IEC61000-3-3</td><td>Complies</td></tr>
</table>

Guidance and manufacture's declaration – electromagnetic immunity – for all EQUIPMENT and SYSTEMS

Guidance and manufacture's declaration – electromagnetic immunity			
The DUS 3 VET is intended for use in the electromagnetic environment specified below. The customer or the user of the DUS 3 VET should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment -guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2KV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line to line ±2 kV line to earth	±1 kV line to line ±2 kV line to earth	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60Hz) magnetic field IEC61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the DUS 3 VET requires continued operation during power mains interruptions, it is recommended that the DUS 3 VET be powered from an uninterruptible power supply or a battery.
NOTE UT is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacture's declaration – electromagnetic immunity – for EQUIPMENT and SYSTEMS that are not LIFE-SUPPORTING

Guidance and manufacture's declaration – electromagnetic immunity

The DUS 3 VET is intended for use in the electromagnetic environment specified below. The customer or the user of DUS 3 VET should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment -guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	1 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the DUS 3 VET, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = \left[\frac{3.5}{V_1}\right]\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	1 V/m	$d = \left[\frac{3.5}{E_1}\right]\sqrt{P}$ 80 MHz to 800 MHz $d = \left[\frac{7}{E_1}\right]\sqrt{P}$ 800 MHz to 2.5 GHz Where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the DUS 3 VET is used exceeds the applicable RF compliance level above, the DUS 3 VET should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the DUS 3 VET

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 1 *V/m*.

Recommended separation distances between portable and mobile RF communication equipment and the EQUIPMENT or SYSTEM- For EQUIPMENT or SYSTEM that are not LIFE-SUPPORTING

Recommended separation distances between portable and mobile RF communications equipment and the DUS 3 VET

The DUS 3 VET is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the DUS 3 VET can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DUS 3 VET as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = \left[\frac{3.5}{V_1}\right]\sqrt{P}$	80 MHz to 800 MHz $d = \left[\frac{3.5}{E_1}\right]\sqrt{P}$	800 MHz to 2.5 GHz $d = \left[\frac{7}{E_1}\right]\sqrt{P}$
0.01	0.35	0.35	0.7
0.1	1.1	1.1	2.2
1	3.5	3.5	7
10	11	11	22
100	35	35	70

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Appendix VI: Order List

The following accessories are recommended to be used on the DUS 3 VET.

WARNING

Probes and other accessories used on the DUS 3 VET must be provided or recommended by the manufacturer. Otherwise, the device may be damaged.

Part Name	Part Number
Probe C611	MS3-102978
Probe C361-1	MS3-102388
Probe L741	MS3-102579
Probe C341	MS3-102575
Probe C321-1	MS3-102577
Probe V741	MS3-113027
Probe V561	MS3-113029
Needle Guide Bracket Kit BGK-CR60	MS3-102338
Needle Guide Bracket Kit BGK-CR40	MS3-102346
Needle Guide Bracket Kit BGK-CR20	MS3-102380
Needle Guide Bracket Kit BGK-LA43	MS3-102355
Needle Guide Bracket Kit BGK-MCR10UA	MS3R-116248
Coupling gel	M50-78001
Foot switch	MS3R-102414
Probe Holder	MS4-102422
MT-802 Mobile Trolley	MS9-102423
Hand Carried Bag	MS1-102424
Video Printer (SONY UP-897MD)	M18-520146
Video Printer (MITSUBISHI P93W)	M18-52147
Silicone Pads	MS1R-109693
Cable Holder	MS1R-102833
Screws (M3×6)	M19-57043
U Disk / Netac, U180 (2G)	11.18.052245-10

Appendix VII: Glossary

Abbreviated	Description
Obstetrics	
EDC	Estimated Date of Confinement
MA	Menstrual Age
CRL	Crown Rump Length
GSD	Gestational Sac Diameter
GSD-H	Gestational Sac Diameter-Horizontal
GSD-V	Gestational Sac Diameter-Vertical
HD	Head Diameter
TD	Trunk Diameter
BD	Body Diameter
BPD	Biparietal Diameter
Cardiology	
LVIDd	Left Ventricle Internal Diameter (end diastolic)
LVIDs	Left Ventricle Internal Diameter (end systolic)
HR	Heart Rate
ESV	End Systolic Volume
SV	Stroke volume
CO	Cardiac Output
EF	Ejection fraction (M-mode)
FS	Fractional Shortening
SI	Stroke Index
CI	Cardiac Index
MVCF	Mean Velocity Circumferential Fiber Shortening
BSA	Body Surface Area
AOD	Aortic root Diameter

LAD	Left Atrium Diameter
LAD/AOD	Left Atrium Diameter / Aortic root Diameter
CA	Cardiac cycle apex A
CE	Cardiac cycle apex E
CA/CE	The ratio of CA to CE
EF SLP	Ejection Fraction Slope
ACV	AC Decreasing Velocity
DEV	Deceleration Velocity
DCT	Deceleration Time
MAVO1	Aortic Valve Volume Opened, beginning
MAVO2	Aortic Valve Volume Opened, ending
AA	Aortic Amplitude
LVMW	Left Ventricular Muscle Weight
AVSV	Aortic Valve Stoma Valve flow
QMV	Mitral Valve Flow
LVLd	Left Ventricle Long-axle Diameter (end diastolic)
LVALd	Left Ventricle Area of Long-axle (end diastolic)
LVLs	Left Ventricle Long-axle Diameter (end systolic)
LVALs	Left Ventricle Area of Long-axle (end systolic)
LVET	Left Ventricular Ejection Time

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EDANUSA
www.edanusa.com

4901 Morena Blvd., Suite 505
San Deigo, CA 92117
Tel: 888.850.4597